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THE ROENTGEN RAY AS AN AID IN THE DIAGNOSIS OF DISEASES OF THE SPHENOID SINUS

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In the introduction to this subject before the American Rhinological, Laryngological and Otological Association in May, 1912, Dr. Skillern very ably set forth the needs of aid in the diagnosis of the sphenoidal sinuses, in which he said that the diagnosis of sphenoidal diseases at best is not an easy matter, and oftimes requires repeated examinations before we can trace a purulent secretion to its origin. General symptoms may be marked and the local symptoms mild or entirely absent. A resection of one or both turbinates is often necessary before the sphenoidal wall is accessible to inspection and subsequent instrumentation.

The recognition of disease of the sphenoidal sinuses by means of the Roentgen Rays follows naturally the study of diseases of the other sinuses and involves only an amplification or refinement in the technique which has so successfully demonstrated disease in the other accessory sinuses. Therefore all of the long list of investigators who have contributed to the study of the accessory sinuses in general have paved the way for the demonstration of disease in the sphenoidal cells, and for this reason are included in the bibliography.

The general impression among Rhinologists and Roentgenologists has been that the rays are of little value in demonstrating disease of the sphenoidal sinuses. This impression must

arise either from faulty technique or from lack of skill in interpretation of the negatives that were made, and I believe the chief fault has been lack in interpretation. I find among my negatives made six and eight years ago distinct evidence of sphenoidal disease which I had not recognized.

Special work has been done along this line by Pfeiffler, Spiess, Scheier, Rhese, Bertini, Brunzlow, Marseblick and Schuller. Rhese has recorded more particularly the end results of the Roentgenological Studies. In his sixty-eight cases with Roentgenological studies, seventy-seven ethmoid labyrinths were found diseased in fifty-three patients, which were confirmed by operation. Among these cases the Roentgenogram showed no evidence of disease in two, in which disease was found at operation. In two others the evidence of disease was only slight, as shown by the Roentgenogram.

In thirty-one patients who came for operation forty sphenoidal sinuses were found diseased. Of these four were not recognized by the Roentgen rays. In none of these cases in which the disease was unrecognized was there a complete examination. Rhese lays great stress on the importance of the oblique view and concludes that where a postero-anterior and oblique view show no evidence of disease there should be no extensive operation undertaken.

He also calls attention to the fact that among the cases studied four showed disease Roentgenologically which was not found at operation. He concludes that previous disease probably resulted in granulation tissue which gave a cloudy appearance to the cells.

Technique. In the first place I believe we should always make our studies complete and I believe that a complete study of the sphenoid involves the other accessory sinus as well. This of course increases the time consumed as well as the expense, but it will go far toward eliminating error, and will at the same time I am sure often show more extensive disease than would otherwise be expected and by so doing the Rhinologist is given full information concerning all of the sinuses, and can treat at once all of them more skillfully, thus lessening the duration of the illness and in the end being distinctly economical.

In my judgment a complete study involves two postero-anterior exposures, two lateral (made stereoscopically) and two oblique. In certain cases to this might be added an antero-posterior and a vertical. When the exposures must be limited as much as pos-

Fig. 2.—Right sphenoidal sinus injected with bismuth paste in a cadaver. Postero-anterior view. Notice the dotted outline of the left sinus which shows as clearly as the one injected.

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sible on account of either the expense or condition of the patient one postero-anterior and one lateral view will give most information and in most instances will suffice for a diagnosis.

The Postero-anterior View (No. 1) is made by placing the patient in a prone position. (When circumstances actually demand it the patient may be allowed to sit up or may lie upon his back, but this will involve unusual or improvised appliances.) The plate is placed under the face so as to include the frontal sinuses and the maxillary sinuses. The tube is placed over the occipital region at a distance of 22 inches and located so that the central rays will pass through the median line and in a postero-anterior plane which extends from the base of the nose through the external auditory meatus. This position must be exact, otherwise if the tube is placed too high the area of the sphenoidal sinus will be projected downward over the middle turbinated bones, and if too low they will be thrown over the shadow of the cribriform plate of the ethmoid.

If the proper position has been used and a good plate obtained the reading of the negative from above downward will be as follows: (1) Frontal bone and brain tissue; (2) Frontal sinuses, not well shown; (3) Cribriforms plate with a few small ethmoidal cells below; (4) On each side of the median line (in a normal skull) a triangular transparent area, with rounded corners, the base of the triangle being in the median line or septum. These areas are approximately one-half to three-fourths inch in diameter. If they are diseased they will be opaque in proportion to the amount of exudate or tumor tissue contained. They may be irregular, deformed or absent. Their walls may be broken down by disease (such as syphilis) or they may be excessively dense as from osteoma; (5) On either side of the sphenoidal cells one will see the projected shadows of the posterior ethmoidal cells and below them the anterior ethmoidal cells; (6) Below this area are the nasal cavities with the middle turbinated above and the inferior turbinated below; (7) On either side of the nasal cavities are the large triangular transparent areas of the maxillary sinuses; (8) Projected into these sinuses one sees the shadow of the atlas bone.

Postero-anterior Position (No. 2) is made particularly to demonstrate the frontal sinuses and thereby find confirmatory or additional information. For this the patient is kept in the same position, the tube is kept in the median line, but is moved about two inches above the occiput. This will vary somewhat

with the shape of the head. The chief features in this negative will be the frontal sinuses above, and the lateral ethmoid cells below, lying just above the upper orbital brim. Below this are found the structures enumerated under position No. 1.

The Oblique Position is used for each side, and both sides should be made for comparison. The patient's head is placed so that the brim of the orbit is resting upon the plate. This will make the weight of the head rest upon the supercilliary ridge, the nose and malar bone. The tube is placed at a distance of twenty-two inches from the plate and in such a position that the central ray will enter the opposite parietal region about two inches posteriorly and one and one-half inch above the external auditory meatus and projected toward the centre of the orbit.

If this plate is properly made the optic foramen will occupy the centre of the orbit, and to the outer side will be found the sphenoidal fissure. Then toward the median line will be projected the sphenoidal sinus—anterior to the optic foramen. Above this will be seen the upper brim of the orbit and above the orbit the frontal sinuses.

The Lateral View should be made stereoscopically when possible, because it will give clearer and more definite information concerning the sphenoidal sinuses, the ethmoidal cells and the sella turcica above.

When only one exposure is made the supposed affected side of the skull should be placed upon the plate. The tube is located at a distance of twenty-two inches so that the normal central ray will pass through the middle of a line drawn from the external auditory meatus and directed perpendicularly toward the plate. When stereoscopic plates are made this same central position should be found, and then the tube should be moved one and one-fourth inch anteriorly or posteriorly from this central point.

In the negatives or stereoscopic views one will then see posteriorly (1) the external auditory meatus, and anteriorly to this (2)the temporomaxillary articulation; continuing forward from this point is (3) the zygomatic arch, and above the zygoma are (4) the sphenoidal sinuses. The sphenoidal sinuses are bounded above by the sella turcica, below by the zygoma, posteriorly by the petrous portion of the temporal bone, and anteriorly by the anterior wall of the sinus; anteriorly to the sphenoid one recognises (5) the posterior ethmoidal cells; (6) the anterior eth-

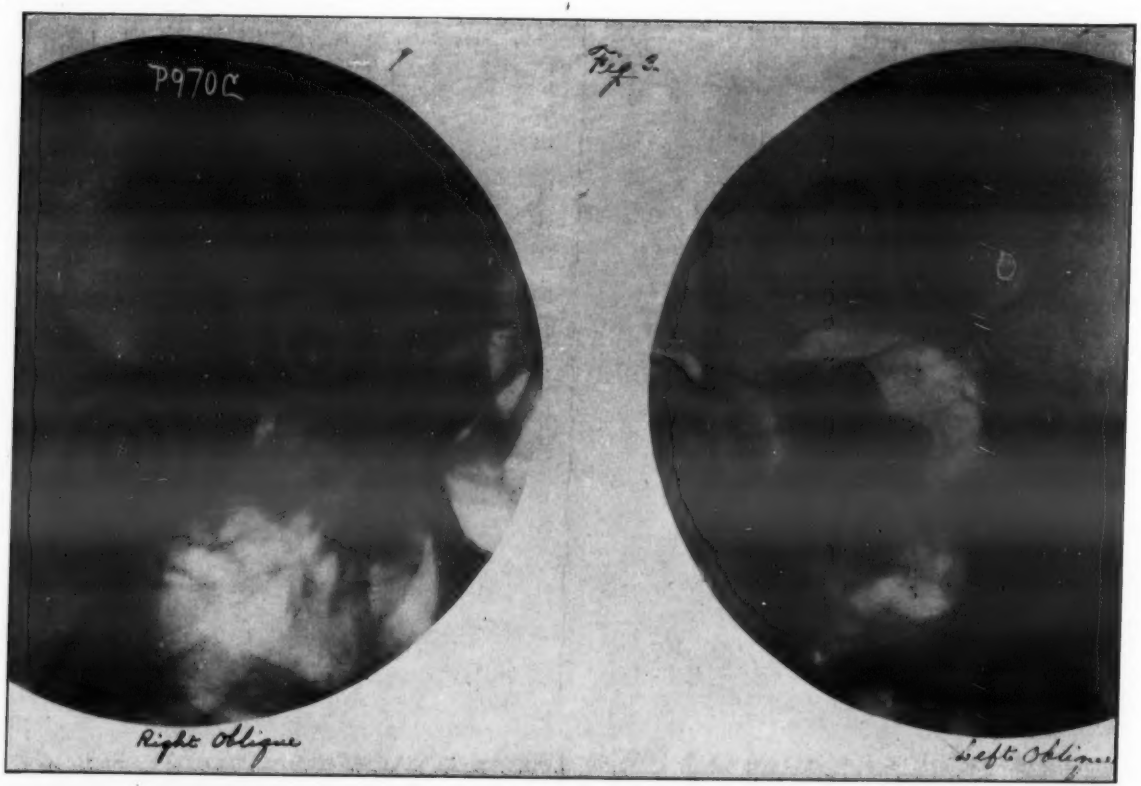

Fig. 3.—Right and left oblique view of injected right sphenoidal sinus. Notice how much further the injected sinus is thrown from the median line in the right oblique view. In the left oblique view the left sinus which is thrown into the outer side of the left orbit is perfectly clear.

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moidal cells, and above and anteriorly to these cells (7) the frontal sinuses; through the ethmoidal cells can be traced the outline of (8) the orbit, and below the orbit (9) the maxillary sinus.

The Antero-posterior View is used in exceptional instances—when on account of the physical or mental condition the patient is neither able to sit up or lie upon the face, such as would occur in fracture of the base of the skull, abscess of the brain or marked dyspnœa. This position has been recommended by Marseblick and Schuller. The patient is placed upon his back, with his occiput upon the plate. The tube is then centered over the base of the nose. This will project the transparent areas of the sphenoid through the occipital region, and between the outlines of the orbits. An opacity of one or both of these areas, in a plate which showed good detail elsewhere, would indicate disease or exudate in one or both sinuses.

REMARKS.

The various accessory sinuses are recognized by the greater degree of transparency as compared with the surrounding tissues. Generally, disease of these sinuses is associated with an exudate, which will diminish the transparency. When the sinus of one side only is involved, it forms a distinct contrast with the opposite side which should be clear. If both sides are involved, this fact can be recognized, providing the negative is good. A good negative will show clear lines elsewhere, even though the sphenoidal area may be quite opaque, and all lines may be obliterated.

If both sides seem to be diseased as is indicated in the postero-anterior plate, this fact can be more positively shown by the opacity of the sphenoidal sinus as is shown in the lateral, or stereoscopic views.

Not only are the Rays useful in diagnosing catarrhal and purulent disease of the sphenoidal sinuses, but valuable information will be obtained also in demonstrating the extent of new growths, and thus complete operation can be done when advisable, or a meddlesome operation may be avoided. (Marschick and Schuller have studied three cases of malignant disease of the sphenoidal sinus in which the floor of the sella turcica was absorbed.) Such new growths will include carcinoma, sarcoma, osteoma, exostosis, fibroma, cysts and mucocele. Infections such as tuberculosis and lues may be studied.

Other indications for a Roentgenological examination are to determine (1) the variety of the sinuses, whether to determine the absence of normal sinuses or to determine abnormal pneumatic space (Recessus supra arbitalis and hollow septum nasi); (2) accidents to the skull—foreign bodies, fractures or collections of blood in the sinus resulting from fractures at the base of the skull; (3) tumors of the accessory sinuses as well as of the base of the skull; (4) intracranial disease, especially hypophyseal tumors.

CONCLUSIONS.

1. The demonstration of disease of the sphenoidal sinus by means of the Roentgen rays depends upon good technique and good negatives. Fluoroscopy need not be considered.

2. As much or more will depend upon the proper interpretation of the negatives as in the making of them.

3. The examination should include all of the sinuses and in each instance should be thorough. This will involve at least four different exposures and usually six or more.

4. Under the above conditions we believe that inflammations (catarrhal or purulent), infections (tubercular, luetic), and new growths (benign and malignant) can be diagnosed in most if not all instances with great accuracy.

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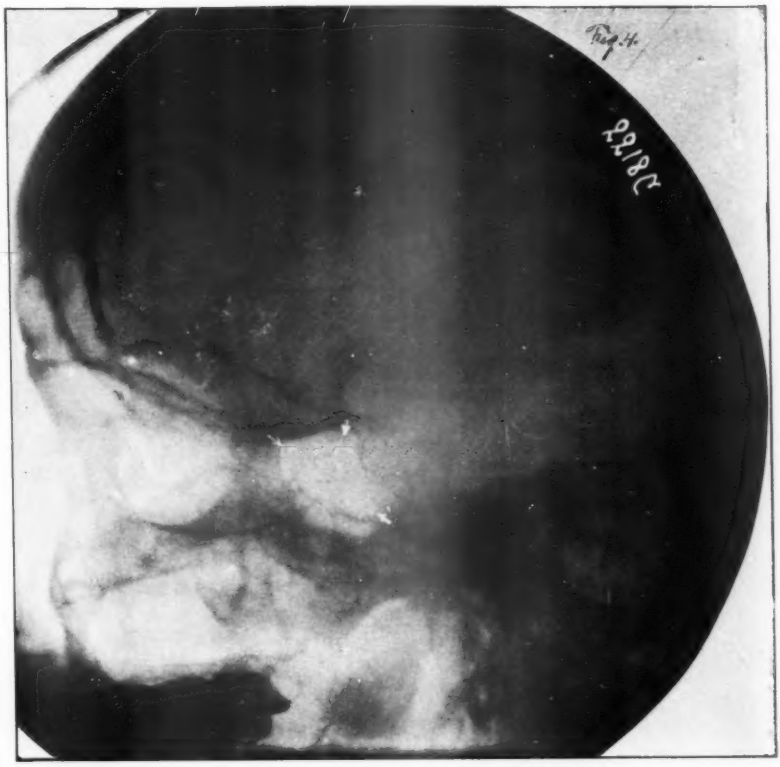

Fig. 4.—Lateral view in living subject, showing smaller left sinus, which contains slight amount of exudate projected inside of the larger right.

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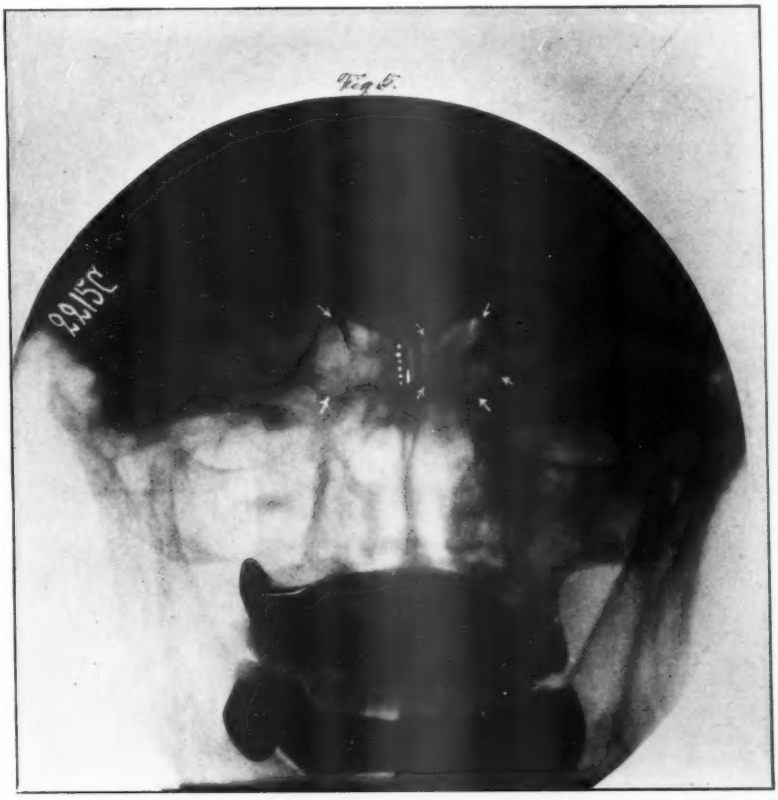

Fig. 5.—Showing postero-anterior view of same patient as Fig. 4. The left sinus is smaller than the right and shows slight amount of exudate.

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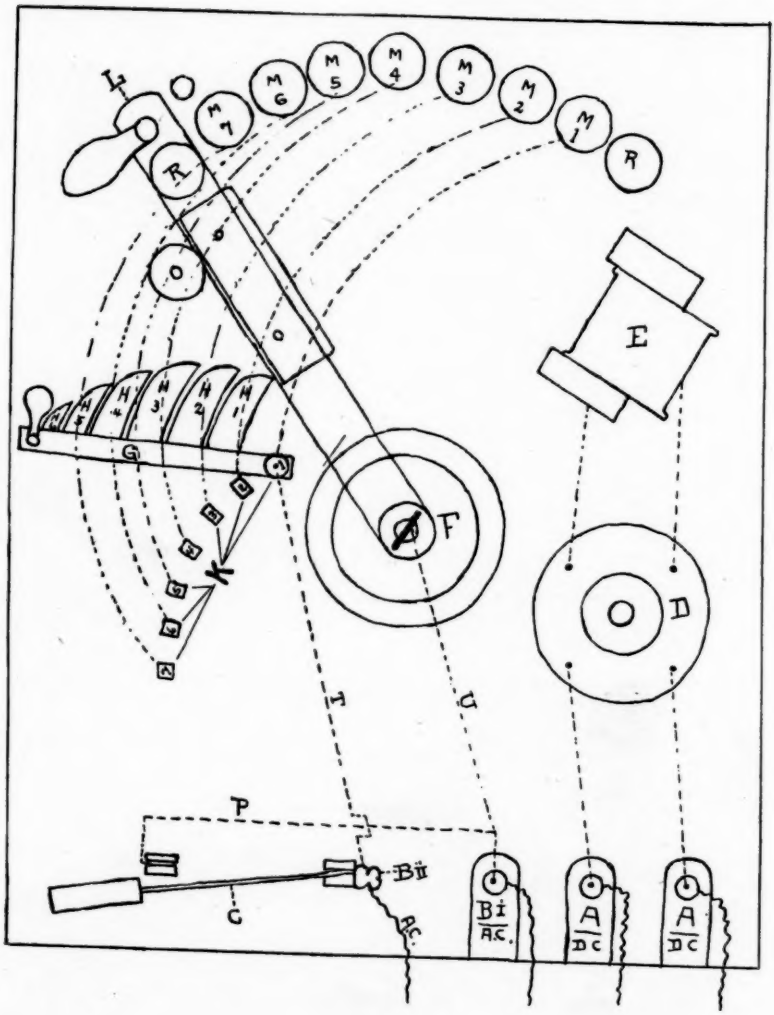
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DEMONSTRATION OF AUTOMATIC SWITCH

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Construction: The construction of most of the Switch you are all familiar with, in that the foundation is the face plate of a Cutler-Hammer starting box for a motor. The addition of a button switch, single throw single pole switch and a multiple contact switch and the necessary wiring makes an ordinary face plate into an Automatic Switch. The resistance coils in a starting box are not used. Direct current is used to operate the electro-magnet, the current can be taken from the ordinary controlling board, providing the magnet is wound for the voltage used in the machine. The button switch is in series with the electro-magnet. The single throw single pole switch is connected so that the Automatic Switch can be thrown in or out when desired. The contact buttons are connected to points on the multiple contact switch which is made up of a strip of iron having connected to it half moon shaped pieces of brass and which can be adjusted so that one or all the contact buttons can be used.

Technique: In order to operate the Switch it has to be attached in series with the current which passes through the primary of the X-ray machine. If the controlling board is so arranged that it has a pole changer, one of the wires leading to one of the terminals on the pole changer is disconnected at the terminal end. Then two wires are used, one being attached to the terminal end, the other to the wire end, and the two wires are connected to the Switch at the terminals marked B 1 and B 11. In order to operate the electro-magnet the direct current is brought to the two terminals marked A. The electro-magnet must be wound for the voltage of the current which is run into it. The purpose of the single pole single throw switch C, is to allow the use of the X-ray machine as ordinarily used and does not allow the use of the Automatic Switch. This condition is brought about when switch C is closed and the current passes in, say at terminal B 1, passing through wire P, through switch C, and out at the terminal B 11. In order to operate the automatic Switch, switch C must be left open. The

contact points M 1-7, are connected respectively to contact points K 1-7. Wire U connects terminal B 1 with terminal F at the base of the starting handle L. Wire T connects terminal B 11 with contact point K 1. The points marked R are "dead" points.

To operate the Switch, begin first by opening the switch which controls the current passing through the primary of the machine, then open switch C, bring the starting handle L across to the electro-magnet E which holds the handle on the dead point R. Then set the multiple contact switch so that only K 1 is connected. Then close the switch which controls the current to the primary and everything is ready for the exposure. In order to make the exposure press on button switch D, this breaks the current passing through the electro-magnet E and allows the starting handle L to speed across the contact points M 1-7.

The path that the current takes is as follows: Say for instance, it comes in at terminal B 1, passes through wire U to terminal F, along starting handle L which makes contact with contact point M 1, then passes through wire T to terminal B 11.

The length of exposure depends upon the number of contact points M 1-7 and K 1-7 that are connected by the half moon shaped pieces H 1-6.

I must apologize for not having taken the time to compute the speed of the switch, but so far I have found that by using the contact points M 1-7, I have been able to make exposures short enough to give sharp cut definition of pericardial structure and lung markings, using an intensifying screen. The exposure is so short that there is no screen mottling to be seen.

Uses: I have used the Switch principally in chest work, using the intensifying screen, and to a certain extent in children, using no screen. For stomach work the speed is too fast and it can be done better by hand exposure.

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ROENTGENIZATION FOR NON-MALIGNANT LARYNGEAL VEGETATIONS*

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To those of us who have had the opportunity of observing an extensive throat clinic, the picture of a child lacking the cheery voice of his or her playfellows or witnessing the efforts of an infant to supply itself by gasps with enough of Nature's free air to keep it alive, is not an unfamiliar sight.

In a considerable percentage of these cases, the cause is found to be the presence in the larynx of a greater or less number of papillomatous vegetations. These growths interfere with the function of the vocal cords or even so nearly fill the lumen that, either by narrowing the passage or by a valve like action, air is prevented in large measure from passing in one or both directions. Although this distressing condition is not frequent, yet every laryngologist of an experience covering a few years is able to report one or more cases that have come under his professional observation.

For the relief of the sufferer, innumerable means have been employed. Brilliant surgery, as well as medicinal measures both constitutional and local, has been exhibited, but the results have been uniform to an astonishing degree. Whatever the method adopted for the removal of these vegetations, or however thoroughly they may have been extirpated, recurrence seems to have been inevitable in the great majority of instances, and the procedure has to be repeated at longer or shorter intervals for an indefinite period.

With these facts in the mind of the specialist, the first case that I shall report was referred and treatment was begun with the full knowledge on the part of the parents that it was purely an experiment, but based on some degree of rationality.

That the etiology of laryngeal papillomata is unknown is evidenced by the fact that almost every conceivable cause has been

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* A preliminary report of the cases 1 and 2 were read by invitation at a meeting of the American Laryngological, Rhinological and Otological Society, Southern Section, in Richmond February 12-13, 1909, and published in the Annals of Otology, Rhinology and Laryngology June, 1910.

assigned for them. It is probably this fact that is responsible for the lack of greater success in treatment.

A papilloma is defined as "a non-malignant epithelial tumor of the cutaneous or mucous surface." Microscopic examination shows it to consist of epithelial cells on a reticulum of connective tissue. The proportion of epithelial cells to the connective tissue may vary greatly so that a tumor which appears to be a true papilloma may, in fact, be more nearly a fibroma. This fact may be a determining factor in the result of the X-ray treatment.

The location of these growths in the larynx seems to be quite inconstant, though the anterior portion of the vocal cords or the anterior commissure seems to be the most frequent site. It is rare that a single tumor attains a relatively large size, but this occurs in some instances. Not infrequently multiple growths are found to involve the epiglottic and tracheal mucous membranes as well as the larynx.

Of the cases that I report, two were single; one involved the anterior portion of the right ventricle and the right vocal cord; the other involved the middle of the right cord. The others were multiple: one involved both cords and extended to the epiglottis and trachea; the other was multiple on the right cord.

Having treated four cases with uniformly favorable results, I am presenting this report, not with the claim that I have a specific, but with the hope that I may arouse sufficient interest to cause the X-rays to be tried in a considerable number of cases so that we may determine its true value and if there be virtue in the method improve the technique and render relief more speedy and certain. All four of these cases were referred by Dr. John Dunn of Richmond, Va., from his private practice.

Taking them in the order in which they were treated, I wish to report:

Case 1. S. C. White, female, age 3 years 2½ months, residing in a distant state, was referred on July 6, 1906.

Her family and personal history were excellent and presented nothing bearing upon the etiology. Three months after birth hoarseness began. This persisted in spite of all efforts to relieve her "bad cold" until the first week in July, 1905, when her respiration became so obstructed that she was brought to Richmond on July 11th. So great was her dyspnœa that a tracheotomy was performed by Dr. Dunn one hour after her arrival.

The following winter, after "a cold" she presented marked evidences of obstruction to her respiration even with the tracheotomy tube *in situ*. This continued without improvement until July, 1906, when she was brought to Richmond and received her first X-ray treatment on July 6th. As the laryngoscope showed extensive bilateral involvement, I planned giving her treatments daily on alternate sides until I should approach the reaction limit, but owing to an intercurrent intestinal disorder and exceedingly inclement weather I was prevented from the strict execution of my intention.

The treatments were given with a static machine, which was capable of passing from one-half to three-fourths of a milliampere through the tube, which read about Walter five. The rays were directed through a lead glass shield to each lateral aspect of the throat at a point corresponding to the larynx, the child being seated in her mother's lap. Each application was of ten minutes' duration, the target of the tube being ten inches from the skin. She was given thirteen treatments within a period of twenty-five days.

In June, 1907, she again returned, this time much improved. Nine treatments were given in nine days, alternating the sides treated. On November 3, 1907, she began her third series and received eleven treatments in nineteen days. At the expiration of this series, the base of a single papilloma that had been present when the series was begun had disappeared entirely. This little tumor lay immediately behind the flange of the tracheotomy tube and was thereby in a great measure protected from the rays.

The tracheotomy tube was permanently removed by Dr. Dunn July 21, 1908. A letter from her mother, dated January 26, 1909, reported the child as "fine, can talk as loud as anyone would have her," although the tracheotomy wound was not then entirely closed. This, however, healed a short time thereafter, and the child remained in excellent health and presented no evidence of recurrence until November, 1911, when she suffered an acute infection of the tonsils and died on November 16, 1911, following an operation upon her pharynx, the nature of which I have been unable to ascertain.

Case 2. J. McL. White, male, age 6 years. Multiple papillomata of right cord. Referred on July 30, 1908. Tracheotomy had been performed by Dr. Dunn two years previously. The laryngoscope showed that the condition of his larynx was prac-

tically unchanged since the operation. Treatments were begun immediately, using an induction coil with mercury interrupter, tube reading Walter five, three-fourths to one milliampere in the tube circuit, target fifteen inches from the skin, duration of each five minutes. Daily applications were made, alternating the sides treated. Patient received eight treatments in eight days. His parents were instructed to bring him for a second series after six weeks. Owing to illness in the family and for financial reasons the patient was kept at home in a distant city.

A letter from his physician, dated January 21, 1909, stated that "his improvement has reached a point where he can now breathe through the pharynx fairly well with the tracheotomy tube removed and the opening closed with the finger. I doubt whether it would be safe yet to leave the tube out permanently as there is still some obstruction to his respiration."

By reason of a change of residence and the obscurity of the family, I have been unable to ascertain the present condition of this case. The last report received was the publication under glaring headlines in a daily newspaper, of the wonderful cure of J. McL. effected by another physician, who had continued the X-ray treatment.

Case 3. R. P. White, male, age 10 years. Referred May 4, 1911. Hoarseness began "about Christmas," 1909. This continued and in July, 1910, a "specialist operated on him for enlarged tonsils." His condition did not improve and in December, 1910, he contracted laryngeal diphtheria, requiring intubation. The patient made an uneventful recovery except that his voice did not return. When referred to me, he had a single comparatively large papilloma, located in the center of his right cord.

Ten treatments were given in twenty-three days, the technique being the same as in case 2 except that the target was placed at ten inches instead of fifteen, and treatments were directed to the front of the larynx instead of laterally. He was instructed to return in six weeks for further treatment. A letter from his father three weeks after the end of the series stated that there was little or no improvement in his condition. I had heard nothing further from him until August 6th of this year when in reply to a letter asking for a report on his condition and for some points in his history that were not quite clear I received from his mother a letter, from which I quote as follows: "I waited for him to improve until he was taken with diphtheria

the following December * * * * and [you] are familiar with the remainder until you treated him last August.* He began to improve after that, and gradually got better until his voice is almost, if not quite, normal. I should have taken him back to you as suggested, but my little girl had a spell of typhoid fever right about the time set for him to go, which, of course, prevented my doing so."

Case 4. F. T. White, male, age 11 years. Now under treatment. Personal and family history, good.

He has noticed a slight hoarseness for the past four or five years. Hoarseness gradually increased until one year ago his voice was entirely lost. He had consulted several physicians in his home town without receiving specific information. The correct diagnosis was first made by Dr. Thomas Edmunds of Danville, Va., who made local applications without benefit. He was sent in April of the present year to Dr. Dunn, who immediately referred him to me for X-ray treatment.

The laryngoscope showed a single relatively large papilloma emerging from the right ventricle and involving the anterior third of the right vocal cord.

The first series consisted of eleven treatments in twenty-one days. There was no material change in his voice, nor was there reduction in the size of the tumor following this series. An accident to the tube in which I placed most confidence necessitated the use of another which I considered not so well suited for this treatment, and I am sure from the subsequent course of events that the tube was largely at fault.

The patient returned in seven weeks, and the tumor was found to be slightly larger than before the first series. The second series was begun on June 19th, and nine treatments were given in seventeen days. About the middle of this series the voice began to improve, and when the boy left for his home, his phonation was practically perfect, and the tumor was found to be reduced to approximately one-third of its former size. This improved condition, however, remained only about two weeks, and when he returned to me on August 19th, phonation was about as bad as before. I have just completed his third series, and his voice has again returned. I shall not repeat his treatments for perhaps six months in order to observe the effects of the raying already done.

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* My records show that she is mistaken in the month.

As mentioned previously, I can easily conceive of a case in which the vegetations may appear to be simple epithelial tumors but which by reason of a great preponderance of connective tissue may resist the treatment and result in absolute failure.

In the cases first treated, there was little attention paid to the thyroid gland, but thus far no untoward results have been noticed. Where only one side is involved, the opposite lobe of the gland may be easily protected, but in the involvement of both sides, protection would be imperfect.

In case 4, which has received more raying than any of the others within the same time limits, I have been protecting the lower portion of the right and the entire left lobe.

Whether the apparent cures in the first three cases were merely instances of the spontaneous recovery that is occasionally, though rarely met with, or whether my efforts were responsible, I know not. I am, however, forced to believe that the transient improvement in case 4 has been produced by the action of the rays, and I only hope that following the last series given him the improvement may be permanent.

312 E. Franklin St.

CIRCULATORY OPACITY

A PRELIMINARY REPORT

BY E. H. SKINNER, M. D.,
KANSAS CITY.

The ability to witness the circulation of the blood would offer much to physiology and diagnosis. The use of opaque media in the blood stream would be necessary. Media opaque to the X-ray at the present time consists of: 1. Bismuth salts in emulsion. 2. Silver salts in solution. 3. Iron preparation in emulsion and solution. 4. Mercury salts in emulsion and solution. 5. Lime salts in solution.

Our present knowledge permits the use of a 5% solution of colloidal silver in the blood stream for septic conditions. Citations: Plehn (Krankenhaus des Urbans. Berlin), Deutsche med. Wochenschrift, December 24, 1908; Seidel (Surgical Division of the Dresden Hospital), Deut. med. Wochenschr., July 30, 1908; Bonneau, Presse med., 1909, No. 28; Lee and Terry, Long Island Medical Journal, November, 1908; Parks, "Principles and Practise of Modern Surgery," (Lea Bros. & Co., Philadelphia, 1907); Dunger, Munch. med. Wochenschr., Sept. 3, 1907.

The writer furnishes the preceding references to indicate that the intravenous injection of colloidal silver may be feasible and harmless.

It is a fact that a solution of colloidal silver will produce a distinct shadow upon the Roentgen negative. The applicant has demonstrated this, and the confirmation subjects the following authorities:

1. Injection of the kidney pelvices for the diagnosis of hydronephrosis by the Roentgen method. Voelker and Lichtenberg, Munch. med. Wochenschr., 1909, No. 18. Von Bergmann Mediz Klinik, 1909, No. 11.

2. Volker und V. Lichtenberg, Roentgenographic des Nierenbeckens nach Collargal Fullung. Munch. med. Wochenschr., 1906, No. 3. 1906, p. 105.

3. Lichtenberg und Volker. Pyelography. Kongress der Rontgengesellschaft, Berlin, April 3, 1910.

4. Haenisch, Dr. G. Fedor. Rontgendiagnostik des uropoetischen systems. 1908.

5. Braasch, W. F. Deformities of the Renal Pelvis, Annals of Surgery, March, 1910. Vol. LI., No. 4.

6. Uhle, Dr. A. A.; Brahler, Dr. G. E.; MacKinney, Dr. W. H.; Miller, Dr. A. G. Combined Cystoscopic and Roentgenographic Examination of Kidneys and Ureter. Annals of Surgery, March, 1910, Vol. LI., No. 4.

The only previous work along this line which the writer has discovered has been published by Dr. O. Franck and Dr. W. Alwens, entitled, "Kreislaufstudien am Rontgenschirm." Munch. med. Wock. Year 57, No. 18, May 3, 1910.

While no attempt has been made to produce X-ray negatives in the living subject by the use of the colloidal salts of silver in the blood stream, we have injected the blood vessels of an amputated arm and obtained fair views of the blood vessels and capillaries. The negatives were made with a twelve inch coil and could no doubt be wonderfully improved with a transformer and intensifying screen.

X-RAY STUDIES OF THE ILEOCECAL REGION AND THE APPENDIX

BY JAMES T. CASE, M. D.
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The investigation of the upper alimentary tract by means of the X-rays has engaged the attention of leading Roentgen workers ever since the advent of the bismuth meal, and the various details of the examination and the limitations of the Roentgen method in studying the pathology of the esophagus, stomach and duodenum have now received proper recognition among Roentgenologists. Much the same can be said of the X-ray examination of the colon, though the information obtainable by this method is so promisingly helpful in addition to the older methods that one is only stimulated to renewed endeavors to work out the details of technique and interpretation which are still unsatisfactory. Perhaps one of the least explored fields of gastro-intestinal Roentgenology at the present time is that centering in the ileocecal region, including the terminal ileum, the ileocecal valve, the cecum and the appendix vermiformis.

Among the earliest studies of the ileocecal region was that presented by Holzknecht in 1907 concerning the value of the Roentgen investigation of the bismuth-filled alimentary tract in the diagnosis of the ileocecal region. During the preceding year Albers-Schönberg called attention to appendical concrements as a possible source of error in the diagnosis of ureteral stone, and Fittig and Weisflog each reported a case of appendical calculus diagnosed radiographically. X-ray studies of the appendix have also been reported by Bennett (1908), Béclère, Leven and Barret (1909), Aubourg, Liertz, and Jordan (1910). Stierlin's work on the ileocecal region has been particularly helpful as has also the work of Dietlen, Kienböck and Haenisch.

One of the most important lessons taught by the careful researches of the foregoing is that the X-ray investigation of any party of the alimentary tract must include a careful study of the entire digestive system. Just as in radiography of urinary calculi, one does not feel justified in reaching conclusions with-

out having carefully searched the entire urinary tract, so also in gastro-intestinal Roentgenology one should not voice conclusions until the entire alimentary tract has been studied. The importance of the recognition of this necessity is ably demonstrated in Jordan's work on the ileum, showing the relation between intestinal stasis and various symptoms located in the stomach and duodenum. The technique which follows is only part of the routine pursued in the writer's method of examination of the gastro-intestinal tract, and no opinion is expressed on any single part of the digestive tract until after the entire examination has been carried out.

Technique.—As the opaque medium in intestinal work the writer has used various compounds of bismuth and lately barium sulphate. Bismuth subcarbonate was first used but later the oxychloride, as being perhaps less likely to alter the chemical reaction of the gastric contents and less likely to interfere with the influences controlling the pylorus. A number of European Roentgen workers have introduced the use of barium sulphate, not only for bowel injection but also as a substitute for bismuth in the ordinary Rieder test meal. Schwartz, of Vienna, has given the barium by mouth for over a year without any untoward effects. Koehler, of Wiesbaden, has used the barium sulphate without any untoward results; and was able to report only two cases in which the use of the barium has proved harmful. In each of these cases, a soluble salt of barium was used in place of the insoluble barium sulphate by physicians not accustomed to routine X-ray examinations. The writer has not yet succeeded in obtaining from a wholesale supply house a preparation of barium sulphate which is guaranteed safe from contamination with minute quantities of the soluble barium salts. Accordingly, bismuth oxychloride has been continued as an opaque medium for test meals but the barium sulphate now obtainable is used for the bowel injections. Barium is many times cheaper than bismuth which makes its use certainly desirable.

In studying the ileocecal region, it is important to examine *both after the ingestion and after the injection of bismuth.* The most favorable time after the bismuth meal is from the fourth to the twenty-fourth hour. In many cases, the bismuth begins to pass through the terminal ileum into the cecum by the end of four hours, and in nearly all cases, before the end of six hours.

Two ounces of bismuth added to the Rieder meal is sufficient. Jordan, of Guy's Hospital, administers four to six ounces, thereby lengthening the time required for the stomach to empty itself. No untoward effects have been observed after such a dose. The administration of the bismuth oxychloride meal is carried out in the usual manner. One may employ any of the oriental clotted milks for sale throughout the country under various names, such as Yogurt, Fermolac, Biolactyl, Lactone, Kephir, etc. These serve as better vehicles than ordinary milk or buttermilk, since they keep the bismuth in suspension for a much longer time. The clysma consists of ninety grammes of barium sulphate in a liter and a half of warm water.* Singer and Holzknecht recommend the use of a potato starch preparation as being a desirable vehicle. The clysma is employed only for studying the mobility and relations of the colon and for determining the competency or incompetency of the ileocecal valve. For a study of the motility, a test meal is preferable.

No cleansing enemas are ordered before administering the Rieder meal, but before the injection, it is important that the bowels shall have been cleaned out very thoroughly by means of proper laxatives or by thorough enemas or both. The preliminary cleansing enemas should not be large, but the patient should be asked to retain each one ten or twenty minutes before evacuating, thus better cleansing the upper colon.

The patient lying supine upon the trochoscope, the barium suspension is placed in a container about two feet above the patient and allowed to flow by gravity through an ordinary enema tube and rectal point into the bowel. The rectal point should be introduced only past the sphincter—not more than two or three inches. No attempts should be made to push the tube for a number of inches up into the bowel. It is well to attach a bulb such as accompanies a bulb syringe for added force in case the barium suspension should sediment and clog the tube. Under these conditions, the head of the barium column reaches the cecum as a rule within two or three minutes. Where hindrance is encountered, it may be necessary to force the clysma, either by means of the bulb, or by turning the patient upon the right side, or by using manipulations combined with deep respiratory efforts on the part of the patient.

*To 2½ dr. of gum tragacanth add about 1 oz. of alcohol. Shake well. Add 20 oz. of warm water and shake. Add 3 oz. of barium sulphate, then 20 oz. of water, shaking well each time. This mixture should be made up fresh shortly before using.

The use of the Haenisch trochoscope or some instrument equally good is a requirement for satisfactory bowel study. Most important of all, perhaps, is an easily adjustable diaphragm, permitting at will a large field of illumination or localizing the ray to a smaller area as in the study of some localized point of special moment. The infinitely clearer screen shadow afforded by limiting the illumination to the exact area under scrutiny, makes possible the detection of important details which might otherwise be lost. The use of a protective apron and gloves, even with the Haenisch trochoscope is a feature with which the writer has not yet felt willing to dispense in spite of the fact that many European workers continue, as they have for years, working over these different forms of apparatus without any more protection than afforded by the apparatus itself.

The writer uses a specially constructed fluorescent screen fourteen by seventeen inches square with a border about three inches wide on all sides, protected with lead. By means of proper handles, this screen can be placed over the patient in any desirable angle and with any desirable pressure. During the introduction of the barium clysma, the screen should not be allowed to rest heavily upon the patient's abdomen but should be supported by an assistant or by some suspensory device.

Before beginning fluoroscopic work, preparation of the eyes by a few minutes' stay in an obscure light or in a totally dark room is an absolute essential. Professor Béclère, of Paris, who has made precise experimental observations, states that after ten minutes in the dark, the sensibility of the retina to the light of the fluorescent screen becomes fifty to one hundred times greater than on emerging from broad daylight and after a longer interval it still increases.

A very great convenience in radioscopic work is an overhead green light connected with the foot switch attached to the coil. Whenever the tube is not in use, the overhead light is automatically turned on, but the moment the pressure of the foot turns the current through the tube, the overhead light automatically goes out. It is also convenient to graduate the intensity of the overhead light by means of an ordinary rheostat on the wall.

The great majority of our trochoscope examinations after bowel injection have been made between 10:30 and 12:00 A. M. and between 4:30 and 6:00 P. M. An effort has thus been made,

by carrying out the examination at an almost uniform time after meals, to make constant whatever influence may be exerted upon the opening or closing of the ileocecal valve by the relation of meals to the time of injection.

Everything having been made ready and the eyes thoroughly prepared, the clysma is started and its progress watched, inch by inch, as it ascends the colon. The temperature of the clysma should be one hundred degrees as being best tolerated by the patient. Should a pause be noted in the onward flow of the barium column, one first makes sure that there is not a kink in the rubber tube or a clogging of the tube. At intervals during the inflow, special points may be studied by manipulations under the screen with the protected hand or by means of a wooden spoon (Holzknecht) or by having the patient turn from one side to another. Radiograms or tracings may be made at important moments to record special phases of the situation.

In cases where the preliminary cleansing has not been complete, small collections of fecal matter may be accumulated by the stream in its progress upward and may cause the filling of the cecum to be imperfect or slowed. Careful observation will easily eliminate these sources of error.

Whenever special features are noted in a given case, it is important that the examination should be repeated at some later date—better after several days—in order to place a reliable check upon the conclusions drawn from the previous observation.

The actual exposure of the patient to the ray during fluoroscopic work is practically negligible, provided one has means at hand for immediately cutting off the current the instant it is not needed. A convenient foot switch makes this very easy. By interposing between the tube and the patient filters of aluminum or leather (Pfahler) and the canvas upon which he lies, the likelihood of a dermatitis following the examination, even when considerably prolonged, is not serious. In the writer's experience, there has not occurred a single instance of Roentgen dermatitis following radioscopic examination.

Haenisch who employs a mixture of bolus alba, bismuth and water, urges that after the examination, thorough enemas should be employed to eliminate the Fuller's earth from the bowels. In the writer's formula, in which the Fuller's earth is omitted, it is not found necessary to take special precautions to remove the barium except in cases of actual obstruction where the patient is unable to expel it spontaneously.

After studying the patient on the trochoscope, first supine, next lying on the right or on the left side, or with the hips elevated, he is then placed in a vertical fluoroscope and observation is made in the erect position. The observations upon the barium-filled colon being concluded, the patient is allowed to evacuate the clysma, after which observations should be repeated to determine how successful the evacuation has been. Haenisch withdraws the enema instead of allowing the patient to expel it. While this is particularly helpful in the study of the lower colon, it is probably of minor value when investigating the ileocecal region.

It may be well to repeat that the barium clysma gives valuable information regarding the size, relations and mobility of the bowel, and, when used according to the careful technique worked out by Haenisch, information concerning stenosis of the bowel or bowel motility, but in pursuing the studies of interest in this paper, the Rieder or some similar test meal is an essential. It was only after the writer began to study the bowel and especially the cecum, following the Rieder test meal that he observed that the lumen of the appendix was very frequently filled with bismuth. In the last three hundred bismuth meal examinations, I have been able to demonstrate the bismuth-filled appendix radiographically in thirty-eight cases, but I have rarely seen the appendix filled in connection with the bismuth clysma. With the bismuth meal, the cecal shadow is more dense, more complete, and the bismuth by mouth is more convenient and less distasteful to many patients than the injection, and the determination of adhesions and points of localized tenderness about the cecum may be more easily made. On the other hand, during the barium injection, the process of filling the cecum may be watched under the screen, the competency of the ileocecal valve may be determined, the presence of filling defects is more easily made out, and the actual capacity of the colon is better determined.

Examination of the Terminal Ileum and the Ileocecal Valve.—In the majority of cases, bismuth does not begin to pass from the illeocecal valve until four hours from the time of ingestion. Under certain circumstances, viz: duodenal ulcer, achylia gastrica, carcinoma of the stomach producing pyloric insufficiency, and in cases of perigastric adhesions especially about the pyloric end of the stomach, the head of the bismuth column may reach as far as the middle of the descending colon

within four or five hours. Usually, however, observation four or six, twelve and twenty-four hours after the test meal will give ample information concerning the state of the terminal ileum.

The presence of stasis is easily determined at a glance at these observations. The presence of adhesions about the terminal ileum is not so easy of determination. The following maneuvers are helpful in determining the presence of ileal adhesions which produce stasis:

First.—Inspection of the ileocecal region reveals the terminal ileum distended with bismuth but separated from the cecum by a more or less constricted area of ileum.

Second.—During the movements attending deep respiration a point in the ileum may be observed which does not change its position although the adjacent bismuth-filled bowel moves up and down. It should be remembered, however, that where adhesions exist between the cecum and the terminal ileum, their presence cannot be determined in this manner.

Third.—By palpation under the screen with the protected hand or with a wooden spoon, the position of the various mobile shadows may be changed while the fixed point remains immovable. The fixed point is often the seat of pain on pressure. In determining the presence of adhesions, between the cecum and the terminal ileum in this manner, one may note whether the shadow of the tip of the cecum and of the terminal ileum may be moved independently of each other.

Fourth.—By performing the above maneuvers with the hips elevated as in Trendelenburg's position.

Fifth.—Examination with the patient lying on the left side.

Sixth.—Examination with the patient erect shows in many cases a descent of the cecum and movable ileum towards the true pelvis while the fixed point in the ileum remains only slightly or not at all changed in its position. In a certain number of cases, however, the cecum itself is also fixed so that this point of the examination often fails.

Seventh.—In a considerable number of cases the making of stereoradiographs gives additional information invaluable in confirming a diagnosis of adhesions.

The report from the attending physician or surgeon as to the presence or absence of tenderness, enlargements or adhesions of the right uterine appendages and an inquiry into the history of the patient give further necessary points of differentiation.

The ileum may be fixed at more than one point, and in a large number of cases, the fixation is attendant upon a perityphlitic inflammation which limits the possibility of determining definitely the exact location of ileal kinks.

In the study of ileal kinks, the clysma as well as the Rieder meal is of value when the ileocecal valve is incompetent. Kraus has found in 150 autopsies after deaths from all causes, twelve cases presenting incompetency of the ileocecal valve. Out of a series of the last two hundred gastro-intestinal cases referred to the writer for Roentgen examination, thirty-three have shown the ileocecal valve incompetent as determined by the barium clysma.

Singer and Holzknecht remark upon the relative frequency of the insufficiency of the ileocecal valve—three out of fifteen cases examined by clysma presenting this condition. Sometimes only a few inches of ileum are filled and at other times, the clysma may ascend many feet of the small intestine. When this has occurred, it is best to allow the patient to expel the clysma from the colon, after which he returns to the table and detailed study of the terminal ileum is thus more satisfactorily made without the confusion of overlying shadows of the barium-filled colon. Radiographs, especially when made stereoscopically, again afford valuable information.

Ileal stasis may be observed, not only associated with ileal kinks, but in colon obstruction from any cause and is more marked the nearer one finds the obstruction to the cecum.

Sometimes the distension of the terminal ileum causes it to drag heavily upon the mesentery and in this way indirectly produces duodenal stasis and dilatation, with corresponding dilatation and stasis in the stomach. Such cases have not been at all uncommon in Jordan's wide experience. Our experience confirms Jordan's opinion that there are at least a certain number of cases in which this combination of pathological findings may exist. Comment should also be made on Bloodgood's idea that not only may the drag upon the mesentery be due to ileal stasis but it may also be due to prolapse of the right half of the colon.

In the differential Roentgen diagnosis between a true pyloric stenosis and gastrectasis dependent upon ileal stasis and drag upon the mesentery, it may be said that in the former, there will usually be some pressure pain point associated with the pyloric shadow, absence of ileal stasis and absence of distension of the

duodenum. The writer has not observed anti-peristalsis in any case of gastrectasis due to ileal stasis and mesenteric drag.

The determination of incompetency of the ileocecal valve must be of great importance. Anatomists agree that the valve is normally competent, preventing the return of gas or fluid cecal contents into the ileum. The work of Cannon, particularly as regards anti-peristalsis, makes it very probable that this view of the matter is correct. Surgical experience shows numerous confirmations of the fact that the normal ileocecal valve is thoroughly competent.

Groedel before the Eighth Congress of the German Roentgen Society, 1912, read a paper on the Pathological Changes in the Region of the Ileocecal Valve in Cases of Ileal Stasis, in which he states that with rectal injection, the contents of the bowels are frequently seen to pass upward through the ileocecal valve into the ileum and he believes that where this is well marked, the incompetency is due to chronic perityphlitis. Haenisch, Holzknecht and others have noted the comparative frequency of this incompetency.

As above noted, Kraus found the ileocecal valve incompetent in only twelve cases out of one hundred and fifty examinations. He states that the ileocecal valve in new born infants is patent, but in a child of five, it was found, postmortem, to be competent. The writer observed that the ileocecal valve of a pig and of a dog was competent, withstanding enormous distension of the colon. Kraus found that the bowels with incompetent valves showed the following particulars: First.—The colon and cecum broad (in all of them). Second.—Colon quite straightened (Straight anterior taenia). Third.—The three haustra are in apposition. In other words, in bowels with insufficient ileocecal valves, he found the same changes as in incompetency artificially produced. The writer has found that, in the main, the above holds good, but one sees frequently the valve competent with a large, widely distended cecum, and, *vice versa*, incompetency of the valve in the presence of a cecum of normal size and shape.

During the injection of the colon it will sometimes be observed that after the barium clysma has proceeded without interruption clear to the cecum, the stream passes on through the ileocecal valve before there has been time for an accumulation of pressure through distension of the cecum. In these cases, the barium stream passes through the ileocecal valve just as the

first swallow of a bismuth-water mixture is often seen to pass through the pylorus. This observation certainly eliminates, in these cases at least, the factor of distension through overfilling as being the cause of incompetency of the ileocecal valve. In other cases, however, it is seen that the barium clysma does not pass on into the ileum when it first is injected, nor even during the time required for close inspection of the ileocecal region, but after the patient has evacuated the clysma and has returned to the trochoscope, it is seen that the barium has meanwhile penetrated into the ileum and that the valve has been patent, indicating some relaxing influence associated with the effort at bowel evacuation. Again in numerous cases it is observed that even though there is marked distension of the bowel the ileocecal valve remains competent. It seems, then, that there are at least three classes of cases of patency of the ileocecal valve:

First.—Incompetency of the valve associated with over distension of the walls of the cecum, which, as Kraus has so clearly pointed out, interferes with the mechanical factors connected with the closing of the valve.

Second.—In many of the instances of valve incompetency, even where the cecum is not at all enlarged and where the element of over distension has been avoided, from the history and other findings in addition to the X-ray findings it is evident that there is a peritoneal inflammatory process in the region of the ileocecal valve which exerts an influence upon the closure of the valve.

Third.—There are probably a number of physiological and pathological factors which operate to open the valve. Gruetzner has observed that when starch emulsion is injected into the bowel along with normal saline solution, starch granules can be washed out of the stomach four to six hours afterwards. Sutherland has failed to corroborate this finding in the majority of cases, although in a certain percentage, insoluble particles such as charcoal could be washed out of the stomach where charcoal was added to the nutritive enema. Examples, such as Church's, where in a case of duodenal fistula the soap and water of the enema invariably flowed through the fistula, are isolated instances and are probably pathological. Swiezenski confirms the observation of Gruetzner that substances introduced with salt solution by enema may afterwards be found in the stomach. Magnus in a paper before the twenty-ninth German Congress for Internal Medicine, makes the statement that with nutritive

enemas, there is frequently seen an opening of the ileocecal sphincter and passage of the nutritive stream into the small intestine. In the case of the bladder, according to von Zessl, the sphincter vesicae opens not only in a passive way, but also by irritation of the nervi erigentes even after the detrusor had been cut through. It seems probable that there are various influences which operate normally to open an intact ileocecal valve through its innervation.

The Roentgen observer frequently sees the whole of the bismuth meal accumulate in the terminal ileum up to the fifth or sixth hour after the meal, not any having passed into the cecum. The patient then takes a second meal and within one or two hours, the head of the bismuth shadow has reached the pelvic colon and the ileum is emptied. This is a frequent observation and indicates that the taking of meals operates to influence the opening or closing of the ileocecal valve. It is probable, therefore, that there may be cases of spasmodic closure of the ileocecal valve, the etiologic factors being similar to those which operate to produce spasm of the pyloric sphincter.

Examination of the Appendix.—It was only when the writer began to devote special attention to the ileocecal region making the examination of this part chiefly with the patient in the reclining position, that he began to expect to find the appendix shadow, and he is now able to report more than sixty cases in which the appendix has been seen and studied during the bismuth examination. Most of the Roentgen workers have, on more than one occasion, accidentally found the shadow of the appendix. The writer must say that he has seen many so-called appendix shadows which were really ileal shadows mistaken for the appendix.

Professor Rieder before the 1912 meeting of the German Congress for Internal Medicine, dismisses the Roentgen study of the appendix by the statement that it is attended by many difficulties. Desternes and Belot report a case of chronic appendicitis in which two radiographs, one with the patient standing and the other with the patient reclining, showed a displacement of the cecum by one centimeter in change of position, while the bismuth filled appendix remained at the same point, from which they conclude that in chronic appendicitis, the X-ray examination of the cecum and appendix gives valuable information concerning the presence or absence of adhesions in the region of the cecum and ascending colon. In the case reported by

Belot, there are no operative confirmations of the findings. Jordan states that he has observed some bismuth in the appendix on several occasions and he cites one case in which the whole of the appendix was very clearly shown. There was a sharp bend of the terminal portion of the appendix which remained unaltered during the few hours that the appendix was visible. In this instance, the appendix emptied itself while there was still a considerable amount of bismuth in the cecum and it did not fill again, thus demonstrating, according to Jordan, the fact of active contraction of the appendix. Jordan concludes, therefore, that the appendix is in a state of tonic contraction alternating with atonic relaxation. At the operation, the appendix was found to be firmly constricted and the end kinked sharply as shown in the skiagram. The kink was due to adhesions and was permanent. In only two or three instances has the writer been able to confirm Jordan's observation that the appendix emptied itself while there was still a considerable amount of bismuth in the cecum.

McEwen, who has made observations upon the cecum and the appendix, states that in some patients, immediately upon taking food into the stomach, there was a cecal movement commencing from below upwards as if expulsive and therefore regarded as probably due to reflex action. McEwen claims that some of these cecal movements originate in the appendix, the undulating movement running upwards from the appendix and causing contraction of the cecum.

That there is often a valve formation at the cecal orifice of the appendix is a common observation. The prominence of mucous membrane caused by an increase of the lymphoid tissue forming a small valve was first described by Gerlach in 1847. In a certain proportion of cases, moreover, the appendix enters the cecum obliquely, forming a valve in the same way that the ureter enters the bladder. The question arises as to whether or not there may be a competency or incompetency of the valve of the appendix just as there may be disturbance of the competency of the ileocecal valve.

Be that as it may, and whether or not the contents of the cecum are normally able to flow into and out of the appendix, authors agree that probably the most important factor in the etiology of the appendical inflammation is poor drainage. Hence, while there may be a doubt as to the actual pathological state of an appendix which permits the bismuth to fill its lumen, it

seems to the writer that there can be no question of the potentiality for danger where the appendix retains the bismuth shadow for many hours and sometimes even for many days after the rest of the bismuth has entirely left the colon. Therefore, the question of surgical treatment should at least be considered in every case where the appendix is visible in the X-ray examination.

Where the appendix shadow is visible a number of points may be determined, (a) by palpation under the screen, (b) by turning the patient this way and that, (c) by radiographic studies, and (d) especially by stereoscopic radiography. Adhesions between the appendix and the cecum, the length of the meso-appendix, the length of the appendix, the caliber of the lumen of the appendix and the position of the organ as related to the cecum are among the points which may sometimes be determined. Occasionally one will find a fleck of bismuth which can be freely moved about within certain limits. A number of such instances have been observed by the writer (and in a few operated upon, the observation has been confirmed) in which it seems evident that the fleck of bismuth was in the freely movable tip of the appendix.

When the bismuth shadow in the cecum is very dense, a retrocecal appendix, even though it contains bismuth, may escape observation, hence it is well to have all patients return at six hour intervals until the bismuth shadow has passed on when it may be that the appendix will still remain visible. In several cases, the writer, by watching at frequent intervals until the cecal shadow has become gray, has been able to determine the position of a retrocecal appendix, closely adherent, and sharply bent upon itself in the form of a staple. The shadow of the appendix may persist for from twenty-four to forty-eight hours to a week. In one case the appendix shadow was still visible on the tenth day after bismuth was ingested. It is a common observation to find bismuth in the appendix two and three days after the rest of the colon has been emptied.

On numerous occasions, examination has been repeated and in some cases, repeated the third time to see whether or not the appendix was again visible. On the other hand, in a number of cases, where the appendix was not visible, the examination has been repeated and most searching observation failed to find the appendix shadow.

Palpation with the wooden "palpatorium" or the gloved finger over the appendix shadow may reveal an area of severe localized pain on pressure. Sometimes the entire ileocecal region is tender but the point which coincides with the appendix is frequently by far the most tender. When the cecum and the appendix shadow is moved by manipulation, the point of localized tenderness moves correspondingly. In this palpation, one must be careful to exclude other sources of pain, such as kinking of the ileum, disease of the uterine appendages, ureteral lesions, etc.

In other cases, the appendical shadow seems to be associated with only moderate pain on pressure or perhaps no pain at all. Even in these cases, if the appendical shadow persists for a long time—for several days even after the rest of the colon shadow has disappeared—one must conclude that the appendix is a potent source of danger through its lack of proper drainage. One should not lose sight of the fact that the appendix may be only one of several manifestations of intestinal stasis, as pointed out by Lane and frequently demonstrated radiographically by Jordan.

In the differentiation between urinary stones and appendical calculus the X-ray examination of the bismuth-filled ileocecal region may be valuable, especially should it happen that the appendix is patent. The writer has had one such case in which a suspected calculus was proved to be appendical by the fact that the bismuth entered the upper part of the appendix for a part of the way, and, though the bismuth shadow in the appendix did not quite reach nor coalesce with the shadow supposed to be calculus, yet by manipulation, it was satisfactorily determined that the two shadows were both in the appendix.

Occasionally small collections of bismuth are found in the lower end of the cecum which radioscopically resemble very closely the shadow of the appendix. Careful manipulation under the screen and a radiograph may be necessary to differentiate.

Study of the cecum after appendectomy frequently gives valuable information regarding the presence or absence of adhesions and the presence or absence of cecal stasis. In the majority of instances, in which pain in the right side has persisted after appendectomy, X-ray examination has revealed more or less fixation of the cecum with a varying degree of stasis in the cecum lasting from twenty-four hours to several days after the rest of the bowel has been emptied. Many of these cases are

associated with adhesions about the terminal ileum. The cecal shadow is frequently deformed by these adhesions.

Summarizing, therefore, the writer has observed that in cases where the appendix shadow has been visible following the bismuth meal, he has always been able to show up the appendix following the second or even the third bismuth meal given after an interval of at least a few days, except where acute inflammation has intervened. The appendix has not been found after the second bismuth meal when it was not found following the first. The bismuth shadow sometimes persists in the appendix for many days after the rest of the bismuth has been evacuated. The appendix shadow is frequently coincident with the point of severe localized pain on pressure. In a fair percentage of cases, the appendix has been visible and yet not the seat of severe localized pain on pressure. Nevertheless when the bismuth shadow persists for days and for sometimes more than a week, the conclusion seems inevitable that such an appendix though not distinctly pathological, possesses a potentiality for danger through its poor drainage. Even in instances where the appendical shadow is not visible through competency of its valve—should such exist—or through obliteration of its lumen by pathological processes, palpation in connection with the Roentgen examination renders great service when appendical disease is suspected by determining definitely the outline of the cecum and permitting much more intelligent and satisfactory study of the relation of the pain point to the cecal shadow and to the shadow of the terminal ileum. Certainly the diagnosis of left sided appendicitis can be more certainly made when examination is practiced in this way.

Tuberculosis of the Ileocecal Region.—Ileocecal tuberculosis is a condition which in a certain number of cases can be almost surely diagnosed by the X-ray examination. Stierlin of Basle has described the Roentgen findings in ileocecal tuberculosis in seven cases. Extensive fixation or constriction of the terminal ileum with more or less fixation and deformity of the cecum and ileum, especially in connection with radioscopic signs of tuberculosis in the lungs, is very suggestive of a tuberculous process. There may be simply the appearance of distended coils of small intestine forming ropy, blotchy shadows rather than the symmetrical shadow of the terminal ileum frequently seen in the true pelvis, or there may be a palpable tumor associated with the cecal shadow in connection with the widely distended small

intestine. In the latter case, the ileum may have such a caliber as to resemble very closely the colon. According to Jordan, the occurrence of tuberculosis in the ileal region is much more common than is generally supposed. In two of our cases, the ileocecal tuberculosis seemed to have its effects in an acute purulent appendical inflammation. In both the proven cases (by operation) there have been evidences of active tuberculosis in the lungs. In at least three of Stierlin's cases there was found pulmonary tuberculosis.

Adhesions of the Cecum and Ascending Colon.—"Agglutinations," probably of embryonic origin, may cause close adherence of the posterior wall of the cecum. The appendix may be involved in such adhesions without having been the seat of inflammation. True adhesion bands, the result of chronic pericolitis or other forms of inflammation, are most often found on the posterior external border of the cecum although they may involve any portion of this organ. The writer has seen one case where there existed a true veil behind which the cecum was tucked away as though in a pocket which had been made for it.

The perityphlitic adhesions which are set up by pericolitis (Jackson) or appendicitis are frequently found to cause curious distortion of various parts of the colon. I have seen a case in which the distal loop of the sigmoid colon was adherent to the diseased appendix and the top of the sigmoid loop adherent to the gall bladder, in a case correctly diagnosed before operation. In this instance, the stereoradiographs were of the greatest importance and led to a recognition of the situation. The X-ray did not reveal the gall stones which were present. The sigmoid was retrocecal and retrocolic, measuring from ileopelvic junction to rectum, fifty-four inches by actual determination at postmortem, the patient having died on the second day in uraemic coma associated with extensive cystic degeneration of the kidneys.

In another instance, the sigmoid loop was shown by stereoradiographs to be procolic, passing up in front of the cecum as far as the gall bladder region, adherent to both the cecum and gall bladder.

In certain other cases, the sigmoid colon occupies an anomalous position in the abdomen which, from the radiograph alone, might be suspected as being associated with adhesions.

Cecum Mobile et Atonicum —Typhlatomy.—This condition, which has been described by Wilms, Fischer and many others,

is easily recognizable radiologically. Associated with abnormal mobility, varying degrees of dilatation and elongation, there is stasis in the cecum long after the remainder of the colon has been emptied. There is often great tenderness elicited by palpation over the cecal shadow. This dilated, elongated cecum is not always mobile, being often associated with adhesions.

Fistulous Tracts Associated With the Cecum.—The injection of Beck's paste through the external orifice of fecal fistulae is also likely to give very helpful information especially when the radioscopic examination is supplemented by stereoscopic plates. Beck's paste has proved more satisfactory for the purpose than the ordinary bismuth or barium suspension in that it causes a denser shadow by its larger percentage of bismuth and it holds its form better after it has cooled. The injection should always be carefully made after Beck's technique. Following the injection of the bismuth paste, the colon may be filled in the usual manner and the relations of the fistulous tracts studied.

Malignant Tumors of the Ileocecal Region.—When the new growth causes stenosis of the ileocecal valve, there is naturally an ileal stasis of varying degree which in its extreme form is typical of complete ileocecal valve obstruction, the distended coils of small intestine having a caliber equal to or greater than that of the colon. In these cases, the chief characteristics are a persistent filling defect in the cecum, usually associated with a palpable tumor, the seat of pain.

Thanks are due Dr. J. H. Kellogg and Dr. R. H. Harris for permission to utilize the reports of cases referred for X-ray study and later operated on by them.

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DESCRIPTION OF PLATES.

Plate I. FIGURE 1. The appendix is long, tortuous and not adherent, but retains the bismuth longer than 96 hours, 32 hours longer than was required for emptying the rest of the colon. There was slight sensitiveness to pressure over the appendix. Typical Lane's kink was present in this case, with adhesions about the cecum.

FIGURE 2. A long, narrow appendix, freely movable in all its parts. No adhesions nor kinking demonstrable, but severe pain on pressure limited to the appendical shadow.

FIGURE 3. A long, narrow appendix, kinked and adherent within its first inch. Retained bismuth three days after the rest of the bowel was emptied. Seat of localized pain on pressure.

FIGURE 4. Appendix long, curled upon itself, retaining the same position at all examinations. Considerable tenderness on pressure exactly coinciding with the location of the appendical shadow. The patient gave a history of several attacks within the last two years, attended by nausea and vomiting, gas in the stomach and bowels, and frequent bowel movements, with constipation in the interim. The X-ray examination showed the stomach to be radiologically normal.

Plate II. FIGURE 5. The appendix shadow does not represent the entire appendix, the distal portion having been obliterated. The proximal half which shows was adherent both to the cecum and to the ileum, and the cecum itself was bound down by adhesions. There was stasis of bismuth in the cecum and the appendix long after the rest of the colon was emptied. The patient gave a history of repeated attacks which had been diagnosed as recurrent appendicitis.

FIGURE 6. Appendix shown retrocecal, bent upon itself and adherent. The appendix shadow corresponds exactly with the spot at which the patient always complained of pain on pressure and described by the patient as "the" spot. Careful examination was made in this case during the appendix operation but no other abnormalities could be discovered. No ileal adhesions were found in this case.

FIGURE 7. Appendix kinked and adherent in its mal-position. No localized pain on pressure. The appendix retained the bismuth only one day.

FIGURE 8. This appendix was retrocecal, adherent and its shadow corresponded exactly with the patient's pain point.

Plate III. FIGURE 9. This appendix is characteristic of a type which the writer considers dangerous, having a lumen wide in its distal portion, but much narrowed near its cecal end. Although the rest of the bowel emptied completely in 53 hours, the appendix was still filled with bismuth. The appendical shadow coincided exactly with an exceedingly tender spot.

FIGURE 10. Another appendix of the class mentioned under Figure 9, dilated in its distal portion, and constricted in its proximal third. Certainly an appendix potent for danger, although up to the present time nothing in the history suggests appendical disease. In this case there was only moderate tenderness on pressure over the appendical shadow. The bismuth meal was repeated on two succeeding occasions and the shadow was seen at all examinations.

FIGURE 11. Appendix shadow seen behind the outer, lower border of the cecal shadow. The appendix was fixed in its bent position, retaining the same shape at all times, adherent to the cecum, but freely movable with the cecum. Although the rest of the colon was empty at the end of 46 hours, the appendix shadow persisted.

FIGURE 12. Appendix shown in Figure 11 after the rest of the bowel had been emptied. This patient had, for years, been subject to aching pains in the lower right abdomen, complicated with three attacks of pneumonia and lung abscess three years before. Prominent internists diagnosed his case as neurasthenia.

Plate IV. Stereoradiogram of the pelvis showing the pelvic colon, the cecum and a fistulous tract between the lower angle of an old appendicectomy wound and the sigmoid. The fistula was filled with Beck's paste, considerable of which passed into the sigmoid (note the denser shadow). The colon was then injected in the usual manner. The patient had an appendicectomy some years before followed by long suppuration and the formation of a fistula. Note the ease with which the fistulous tract can be followed from the skin to the bowel. Observe the subcutaneous blind pouch branching off toward the suprapubic region.

Plate V. Stereoradiogram showing stomach, colon and terminal ileum in a case of ileal adhesions. Note the dilated ileum reaching up out of the pelvis with the constricted three or four inches of terminal ileum separating the dilated ileum from the cecum.

Plate VI. FIGURE 15. Typical Lane's kink of the ileum associated with ileal stasis. The hiatus between the shadow of the dilated ileum and the cecum represents the portion of the ileum which was bound down by fibrous bands.

FIGURE 16. Typical kinking of the terminal ileum about an inch and a half from the ileocecal valve, associated with ileal stasis.

FIGURE 17. Distortion of the terminal ileum associated with adhesions, ileal stasis, and fixation of the cecum.

FIGURE 18. Another case of Lane's kink of the terminal ileum showing ileal stasis.

Plate VII. FIGURE 19. Very much dilated, elongated cecum, freely movable and the seat of stasis. Colon filled by injection.

FIGURE 20. Cecum elongated, freely movable and atonic. Bismuth ingested.

FIGURE 21. Case of incompetency of the ileocecal valve which permits the bismuth enema to pass through the ileocecal valve, filling many feet of the small intestine. This condition was found on repeated examinations.

FIGURE 22. Elongated, dilated cecum, with fixation and kinking of the terminal ileum following pelvic peritonitis.

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PLATE I.

FIGURE 1
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FIGURE 3
FIGURE 4

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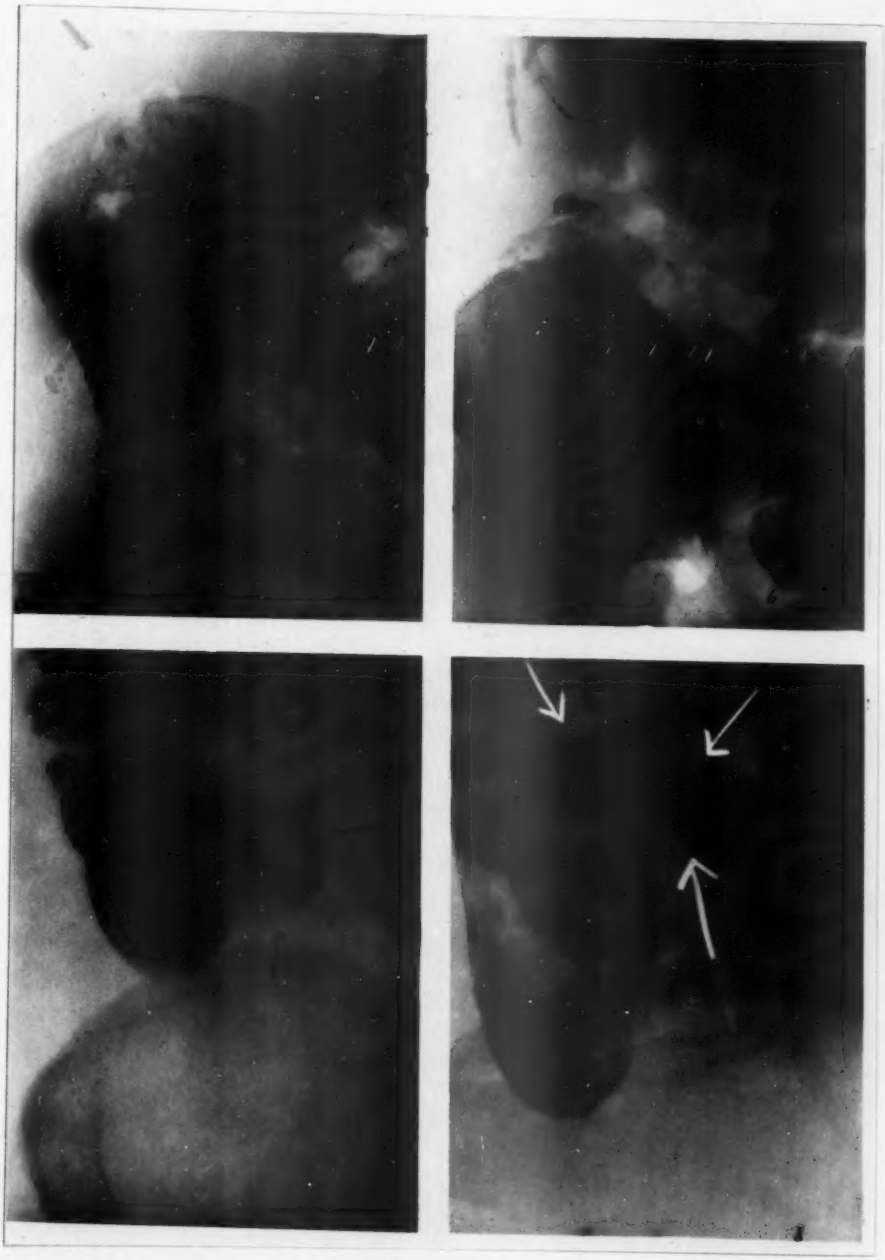

PLATE II.

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PLATE III.

FIGURE 9
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FIGURE 10
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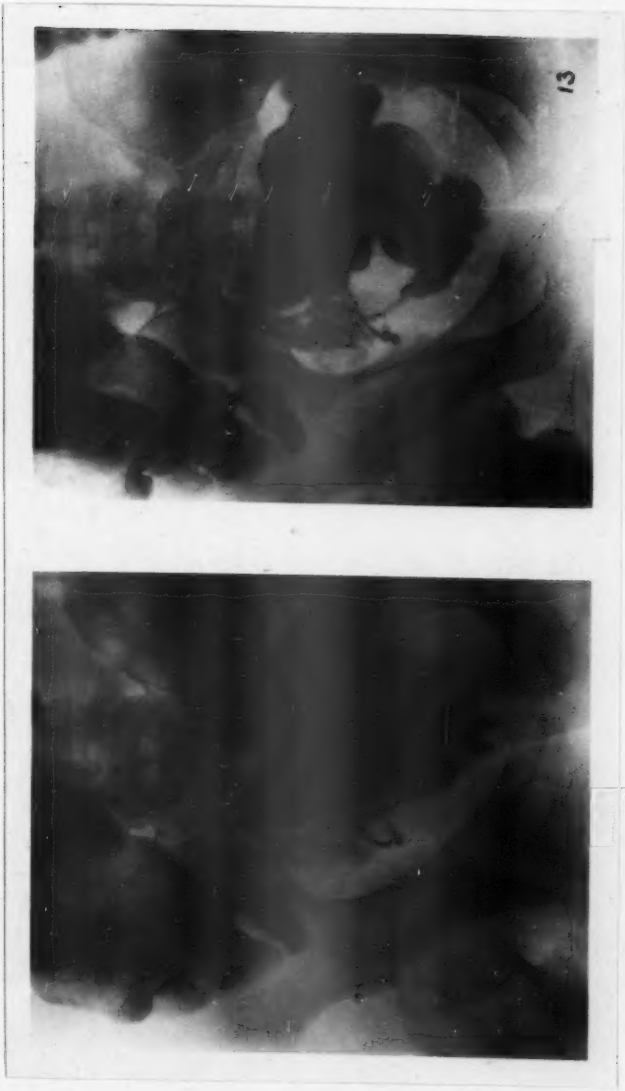

PLATE IV.

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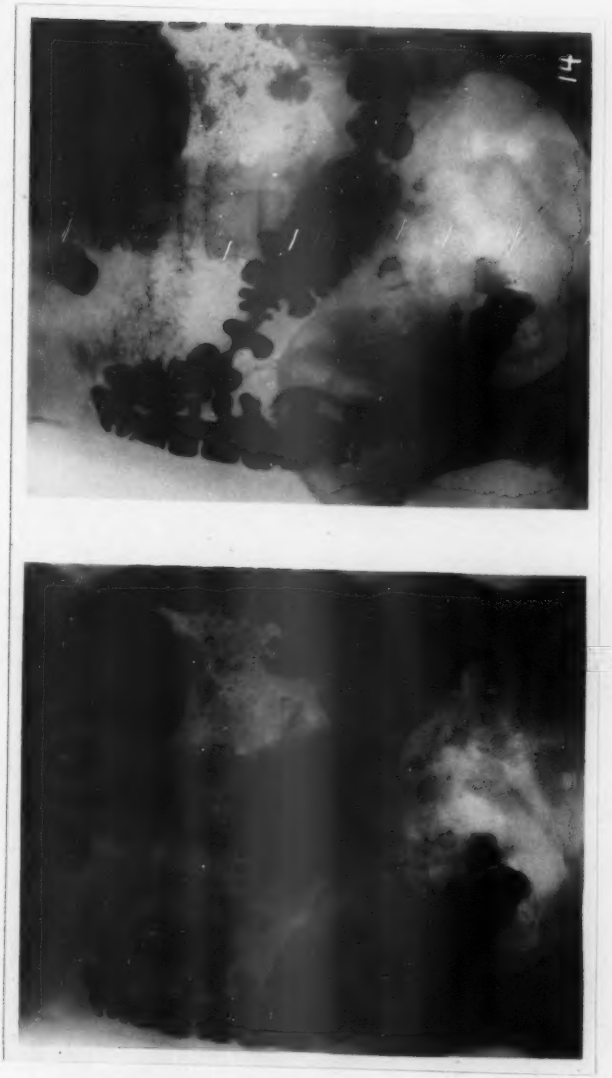

PLATE V.

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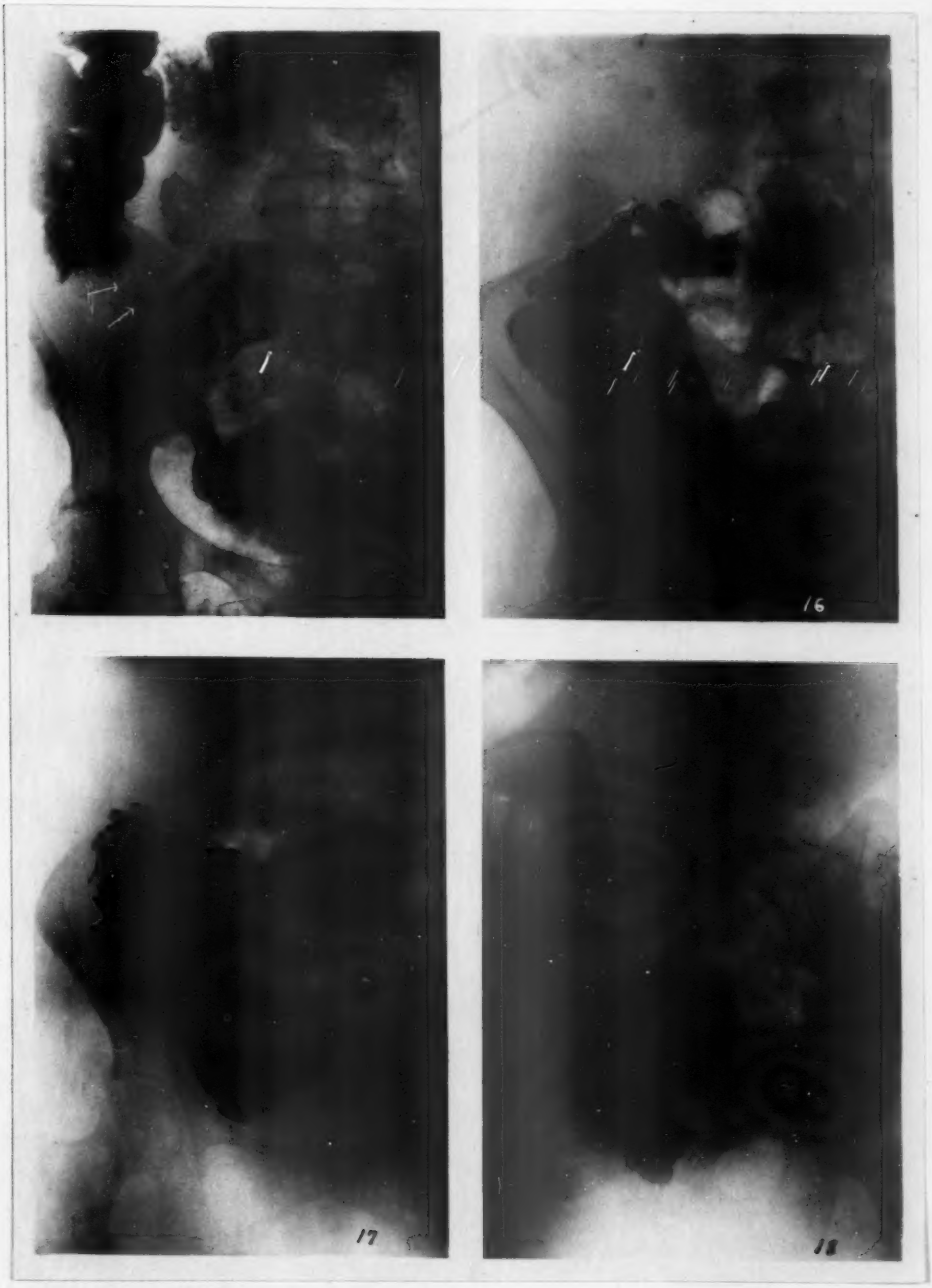

FIGURE 15
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FIGURE 16
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PLATE VII.

FIGURE 19
FIGURE 21

FIGURE 20
FIGURE 22

EDITORIAL

Following the suggestion of the retiring secretary, Dr. Pancoast, a motion was introduced by the executive committee calling for the appointment of a committee on nomenclature. After the resolution was carried the president appointed the following committee: Dr. Zapffe, Dr. David R. Bowen and Dr. Percy Brown. This committee certainly has an important task to perform and its deliberations will be looked forward to with interest. The report of the committee will probably appear in some future number of the QUARTERLY. At present a confusion exists among writers on Roentgenologic subjects in their choice of terms for the products of their work and the means with which they work. As was pointed out by Dr. Zapffe this leads to great confusion. The compilers of the various indices of medical literature have great difficulty in classifying the subjects inasmuch as so much confusion exists in the titles of papers. If this committee which has been appointed suggest a nomenclature which meets the formal approval of the society it will certainly tend to obviate much confusion. As our society is the recognized leader in Roentgenology in this country, its attitude would probably be recognized as authoritative by medical journals and their compilers.

Another important committee appointed was the one upon the beginning of an international work upon standards. As appointed by the president this committee was not designed to carry out the experimentation themselves, but rather to interest physicists and laboratory workers and also to secure the cooperation of various other societies of kindred aims, so that an international movement might be started which would be productive of a good work. At present the absence of standards of radiant force is one of the deepest felt wants of the Roentgen worker. The committee would certainly welcome suggestions from the members of the society as to the beginning of this most important work.

CURRENT LITERATURE.

The Roentgen-Ray Diagnosis of Intraabdominal Neoplasms by Means of the Displacement of the Large Intestine.

(Die Röntgendiagnose intraabdominaler Neubildungen aus der Verlagerung des Dickdarms)

EDOUARD STIERLIN, Basle.

Deutsch Medizinische Wochenschrift, August 1, 1912.

Stierlin advocates studying abdominal tumors by means of the X-ray after having filled the colon with bismuth (per os or per rectum). He believes that tumors of various organs and regions have characteristic influence on the colon, displacing it in definite directions, so that the location of the tumor is possible. His article is illustrated with a number of interesting diagrams. He draws the following conclusions: The diagnosis of intra-abdominal tumors (new growths and abscesses) can be definitely located by means of displacements they cause in the large gut, as shown by means of the X-ray. Psoas and iliacus abscesses appear to cause a characteristic displacement of the ascending colon toward the mid-line. In right-sided pelvic tumors the cecum is lifted upward and toward the mid-line. The typical mesial displacement of the colon in tumors of the kidney is shown much more clearly by this method than by the customary method of colonic inflation.

A Step in Roentgen Technic.

At the last Roentgen Congress in Berlin Dr. Christen of Berne demonstrated an instrument which he had devised to measure the action of the Roentgen rays on deep-seated organs. The instrument gives direct readings of the intensity of irradiation at the depth required, and can be used with any type of Roentgenograph. Dr. Christen uses as the standard of measurement the thickness of a layer of tissue which will absorb precisely one-half of the incident beam, whilst permitting the other half to pass through, i. e., that thickness which will reduce the Roentgen ray beam to half value. The thicker this so-called "half value layer" the more penetrating or "harder" is the radiation. The introduction of this absolute scale of measurement in lieu of the various arbitrary scales used in different Roentgen laboratories is a great advance in Roentgen technique, and its author has laid down laws by which to calculate the most efficient irra-

diation for deep-seated tissues and to determine the correct dose for subcutaneous organs with accuracy. Hitherto this has only been possible when surface tissues have been in question.

The apparatus is made by Messrs. Reiniger, Gebbert, and Schall of Erlangen.

Injurious Effects of Roentgen Irradiation.

A. RAVOGLI.

Jour. A. M. A., August 24, 1912.

The author is decidedly of the opinion that roentgenotherapy is accompanied with more or less danger. This statement is not made for the purpose of discouraging anybody from the use of so powerful a physical remedy, which can bring about a great deal of benefit in a great many diseases, but only to call the attention to the great care which has to be used in giving the X-ray. In some cases the patients have been trusted to inexperienced office attendants, and the physician has noticed the danger only when dermatitis had already set in. When with the X-ray no improvement or no progress is obtained in the treatment of a disease, it is better to stop and change to some other method of treatment; otherwise danger is lurking and will soon be looming up.

When a radiodermatitis has begun, if it is of first degree, a bathing with 2 per cent. solution of aluminum subacetate or of sodium bicarbonate will diminish the itching and the burning sensation, and the skin in a short time will return to the normal condition. If the burn is of second degree with formation of blisters, the continuous bathing with soothing solutions, the opening of the blisters and the treatment as for any other burn will be sufficient. When ulceration sets in recovery is difficult. The best way for a speedy recovery is the excision of the whole ulcerated surface, and consequent surgical treatment.

Comparative Value of Physical Signs and the Roentgen-Ray in Determining Chest Conditions.

E. A. MILLER AND A. J. QUIMBY.

New York Med. Jour., August 10, 1912.

The authors' use of the fluoroscope as an independent means of diagnosis leads them to consider it of great value in estimating the amount of infiltration or fibrosis and determining the excursion of the diaphragm, but as generally used little else is learned that could not be determined by the physical signs, if one has a trained ear and makes a careful examination. However, where good apparatus and proper facilities are provided,

one may acquire experience in its use which greatly facilitates the location of gross lesions for further detailed study. In this series Miller made a careful physical examination in fifty cases, and together both authors studied the skiagraphs and laboratory reports, prepared independently by Quimby, and observed that in the cases diagnosticable by physical signs their findings agreed quite accurately, whereas in a few cases that could not be determined by physical signs, the skiagraphs showed small lesions or enlarged or calcified tuberculous glands at the root of the lung, which explained the physical condition of the patient. As the reports from the clinician and the Roentgen laboratory were almost identical in thirty-two of these, they refer briefly to fourteen cases in which there was some variation.

One case in which a cavity had been diagnosticated, the roentgenogram showed it to be a double cavity, that is, two cavities closely adjoining. In three cases the roentgenogram showed calcified glands not diagnosticable by physical signs. In one case the roentgenogram determined the size and position of the heart caused by several lesions which was a puzzle on physical examination. In two cases the roentgenogram and physical examination wholly disagreed. In one the examination gave flat percussion note with small mucous rales at left apex and left base, but not bronchophony in either locality. The case is an old one, the patient has never shown tubercle bacilli in sputum and has been improving since the discontinuance of injections of tuberculin which had been persisted in for some time, the patient desiring it and the physician in attendance thinking it benefited her. The roentgenogram showed old, extensive, fibrinous bronchitis. In the other case the chart was not made by Miller, and from what he remembers of the case, he is inclined to believe the roentgenographic result, as this patient had a lung capacity of 150 cubic inches and readily increased it to 184. The normal for her height would be about 158, therefore she could not have very much lung involvement with such a lung capacity and no physical signs to account for it. This patient is now practically well, as she had an arrested case some months ago, the roentgenogram showed infiltration of left apex and the physical examiner reported much involvement.

Another case in which the roentgenogram gave findings of fibrous deposit at both apices with bronchitis, the clinical report gave consolidation of left apex and sonorous rales over the left chest; roentgenogram and physical test agreeing on bronchitis.

The examination of sputum was negative in the case. Two cases showed cloudiness of right apex not found on physical examination. One case in which physical test indicated cavitation, Dr. N. N. Stark and Dr. Miller agreed on the findings; whereas the roentgenogram indicated normal lung tissue, surrounded by sclerotic solid lung tissue. One case not tuberculous, in a girl of thirteen years, where the roentgenogram showed a cicatrix, drawing the vessels and heart toward the right side. In another case the roentgenogram showed involvement near the left apex, and physical signs showed involvement of both apices and bases.

The authors offer the following additional suggestions as to the interpretation of thoracic skiagraphs, based on these observations:

In studying any roentgenograph one should bear in mind the two factors of atomic weight and molecular density, as well as the thickness, and the distance of each part from the sensitive plate while the exposure was being made. For example, loose, areolar, and adipose tissue, which contain large proportions of water and hydrocarbons, cast only a moderate shadow, but interfere with fine detail by removing other structures a greater distance from the plate, while the heavy muscles of a workingman, which contain concentrated proteids, cast a shadow much denser than those of a flabby individual, though their apparent bulk may be the same.

In incipient cases of tuberculosis, we notice diffuse congestion around the pulmonary tree, small groups of occluded alveoli in the area of origin or small infiltrated glands, calcification of costal cartilages, and Williams's sign. Again, in old arrested cases, an area of congestion around the hilum, shading off rapidly, usually indicates an exacerbation of an arrested case, while physical examination will frequently reveal only the rales, generally attributed to bronchitis. In a case undergoing resolution this area of congestion presents a more clearly defined border, and if observed at intervals may be seen to gradually retreat toward the hilum.

The mineral salts as found in bone and calcareous deposits, give a very dense shadow with clearly defined outlines, in marked contrast with the soft tissue. Thus, when bronchial glands are in the inflammatory stage, they present a fairly dense shadow of oval or rounded form. When an irregularity is noticed in part of the outline with cloudiness in the adjacent lung shadow it is

believed to be due to a destructive process, while a calcified gland will cast a sharply defined shadow as dense as that of bone. Enlarged pulmonary glands, as observed in the skiagraph, should not be considered indicative solely of tuberculosis as they are noted in leuchemia, malignancy, syphilis, and inflammatory conditions. Boggs states that in his radiographs of a series of cases following operations for cancer of the breast, the bronchial glands were enlarged and showed quite plainly on the plate, but less distinctly than tuberculous glands. In our own cases of primary and secondary carcinoma the same was true and the mottled appearance of the lung tissue characteristic of tuberculosis was absent.

The radiographic picture of pneumonia changes rapidly with the development of the disease. The unresolved cases are occasionally met with and present a peculiar mottled appearance, which we can best compare to the shadow cast on the ground by the sun shining through the leaves of a small bush.

The fibrous tissue and exudates which are found in a thickened pleura might pass unnoticed were it not for their very irregular outline, great variations in density, and the fact that they generally limit the movement of the overlying ribs.

Such conditions as pneumohydrothorax or pyothorax and collapsed lung are usually so sharply outlined that they would be readily diagnosticated by a novice, as even a moderate amount of fluid casts a shadow of such great density that other outlines are obliterated, while air casts no perceptible shadow, thus making a marked contrast with the spongy lung tissue and also permitting greater detail in the image of the chest wall where lung tissue is absent.

In each of these conditions the displacement of the heart and great vessels and compensatory emphysema will be noted to correspond quite accurately with the extent of the process. The collapsed lung tissue itself presents a shadow of very different character from the normal, being hazy and much denser with a sharply defined border.

In emphysema the area of the lung is increased and the shadow is much lighter, while a downward displacement of the diaphragm on the affected side may be noted if the process is extensive.

The authors regularly make two exposures of the thorax, one in the supine and the other in the prone position with the patient lying flat on the plate holder in each case. By a comparison of

these, one readily determines whether a lesion is nearer the anterior or posterior chest wall.

When superimposed shadows of doubtful significance are present, it is often possible to show their extent and nature by a stereographic pair.

They prefer, however, to study doubtful areas separately, and by arranging conditions for the shortest possible exposure have had no difficulty in showing plainly the difference in appearance between the walls of cavities and various forms of dilated bronchi. They find this method advisable also where physical signs are negative, but the skiagraph of the entire chest shows a slight cloudiness in some part.

They have found the skiagraphs especially interesting in cases in which small areas of deep seated consolidation were plainly visible, but as they were overlaid by emphysematous lung, they gave normal resonance and no rales; also in cases in which pleural adhesions or consolidated lung tissue almost surrounded the distended areas, giving a strong suspicion of cavity on percussion. In studying the shadows of the mediastinum they notice that the heart is slightly displaced in a very large proportion of tuberculous patients, that the right auricle is hypertrophied or dilated in almost all advanced cases, also that the position of the arch of the aorta varies so greatly as frequently to arouse suspicion of an aneurysm.

The enlarged mediastinal glands occur with great frequency and occasionally cause displacement of the large vessels or esophagus, which cause confusing shadows.

Roentgen-Ray Study of Gastrointestinal Findings in Multiple Arthritis.

G. R. ELLIOTT, NEW YORK.

Am. Jour. of Orth. Surg., August, 1912.

The object of this study is to present as far as possible Roentgen ray findings of the gastrointestinal tract in patients afflicted with multiple arthritis, to see how far these patients deviate from the normal in a gastrointestinal sense, and if possible to correlate these findings with other findings to aid us in clearing up the difficult problem.

The present series comprises the examination of nine walking patients. No claim is made of expecting by such an examination to establish in any way the primary etiology of the disease in question.

On the contrary Elliott feels very certain that we shall not

find it in this way. But have we here complicating factors bearing on the disease, and how do these factors influence its course? This study was made at the Montefiore Home, and the roentgenograms have been prepared by Dr. Charles Gottlieb. Both bismuth and barium were used. One and one-half ounces of bismuth was given with 8 ounces of zoolak or koumiss. For the enemas a like quantity with acacia and thirty ounces of warm water.

An analysis of the series strikes us at once with the variance from what is now regarded as normal. Eight of the nine cases show some abnormality when compared with our previous conception of the time that the food remains in the intestine, and with the normal anatomic position of the abdominal organs. Four show ptosis of the stomach with delay. Four show ptosis of the transverse colon. Five show delay in cecum and transverse colon—the shortest thirty-six hours, the longest fifty-five hours. At forty-nine hours in one patient the colon was still packed. One shows constricted colon. One shows marked delay in the small intestines. One has a markedly enlarged atonic stomach. Three show enlarged spleen. Several of these patients show two or more of these abnormalities combined.

Here then are findings which Elliott believes should be considered in making a clinical study of patients, findings that we are not justified in ignoring. How far do findings referred to act as a causative factor in producing multiple arthritis or influence its clinical course? Elliott believes that many of these conditions have been acquired since the onset of the arthritic malady.

The stooping attitude of some of the patients under consideration doubtless explained the ptosis of the stomach and transverse colon.

One patient, however, presents this abnormality, yet stands quite erect, and one appears to have the congenitally placed stomach. The delay and sluggish intestinal action too may result from a low grade of intestinal musculature and diminish intra-abdominal pressure. Four of the five patients showing delay have a lax abdominal wall giving a low intra-abdominal pressure. The dilated stomach was gradually acquired. Elliott is convinced that the primary cause is some real infection which does its work rather quickly, intermittently when the focus of infection is not wiped out. After the damage is once started, then acquired conditions irritate the already weakened parts and

a vicious circle is established. The chief contributory feeder, he feels, lies somewhere in the gastrointestinal tract. The article is illustrated.

Action of Radium and Roentgen-Rays on Malignant Growths.

E. H. SHAW.

Bri. Med. Jour. August 18, 1912.

In a case of carcinoma of the breast of an aged woman a recurrence was treated first with Roentgen rays and afterwards with radium. The tumor and glands were reduced very much in size. The patient died suddenly from some other lesion, and material was obtained *post mortem* for histologic investigation. Microscopic sections of the remains of the tumor showed a small spheroidal-celled carcinoma with a well-formed fibrous matrix; the cells stained well, and were seen running in narrow columns from the main mass into the surrounding fatty tissue. Another section showed fibrous tissue free from growth, which looked as if all the cells had been destroyed and replaced by fibrous tissue. A lymphatic gland showed growth with a very scanty amount of fibrous tissue, while a nodule in the liver showed cellular growth with partial necrosis. The nodule of growth which was exposed to the action of the rays was very fibrous, while the other deposits which were further away were poorly supplied with this tissue. Also the nodule in the liver, which was at some distance from the rays, contained a necrotic patch. In another case of recurrent carcinoma numerous nodules appeared in the skin about the scar shortly after an amputation of the breast. The woman was only thirty-two years of age, and, owing to the rapidity of recurrence and extent of the disease, no further operation was attempted. Roentgen rays were applied and the nodules of growth decreased in size in a remarkable manner, but they afterwards grew larger again. At the same time other nodules appeared, and a large area ultimately became affected. Certain nodules were localized and at varying periods removed in order to ascertain what changes were taking place as a result of the application of the Roentgen rays. Microscopically the primary growth was a spheroidal-celled carcinoma with much fibrous tissue. The nodules showed exactly the same type of growth, the malignant cells were small and round, and lay in small groups in a dense network of fibrous tissue. They were well stained, and extended right into the papillae. No necrotic cells were to be seen. Numerous small round inflammatory cells lay among the cancer cells.

A man, aged fifty years, had a large mass of growth in the neck. Part of it was removed together with a piece of the internal jugular vein. It proved to be a small round-celled sarcoma. The treatment by Roentgen rays was followed by a temporary decrease in size of the main mass, but the patient ultimately died with large masses of growth in the neck and thorax. Microscopic sections of various parts of the growth showed round-celled sarcoma with very little fibrous change. A hard gland in the neck, which had been exposed to the action of the Roentgen rays, showed increase of fibrous tissue and necrosis of the central part of the growth. The peripheral cells stained quite well.

In a case of carcinoma of the breast of a woman aged sixty years, Roentgen rays were first applied with the object of softening and breaking down the tumor, and this was followed by the application of radium. The growth was hard and fixed to the skin and nipple. Under treatment it gradually became smaller, and ultimately disappeared. A small nodule was removed from the skin over the tumor toward the end of the treatment and microscopic sections prepared. They showed a large-celled carcinoma in small amount, the cells stained well in some groups and badly in others, while other groups were represented by a granular necrotic mass. Fibrous tissue was abundant, some of it being "hyaline" in character. Small round inflammatory cells were distributed throughout the tumor. The squamous epithelium on the surface stained well in all parts.

Shaw believes that malignant tumors undoubtedly diminish in size under the action of Roentgen rays and radium, but so they do without this treatment—in a small number of cases certainly, but they do. But the proportion of tumors which diminish under treatment is much greater than the proportion which do not. And then there is the fact that some growths actually disappear. This is a great encouragement to persevere in the use of Roentgen rays and radium.

Causes of Failure of Roentgenization in Deep-Seated Cancer.

F. HERNAMAN-JOHNSON.

Bri. Med. Jour., August 18, 1912.

Hernaman-Johnson believes that Roentgen rays depress cancer cells because they have become embryonic in type, for the cells of any given tumor there exists a critical dosage of Roentgen rays from which they are unable to recover. This dosage will vary according to the mitotic index of the growth con-

cerned. The mitotic index, again, will differ in various tumors, even such as closely resemble each other from a clinical standpoint, and will not remain a constant even for the same tumor.

The amount need not necessarily be all delivered at one sitting. The determination of the number, strength, and frequency of irradiations is seen to be a matter of the utmost importance; for a dosage below that which is critical for the cells of a given tumor will never kill these cells, no matter if it be administered for months or even years.

To treat a rodent ulcer with unfiltered rays from a medium tube is to invite failure, for the surface receives a bombardment wholly disproportionate to that sustained by the deeper layers. Not only are numerous soft rays emitted from the anticathode, but a vast number of *adventitious primaries* are given off as a result of electrons striking on the glass of the bulb. All these are highly active physiologically within narrow limits, and as a consequence the ulcer heals rapdly on the surface. Cessation of treatment will almost certainly be followed by relapse, while persistence will result in surface irritation.

No case of rodent ulcer should relapse because the deeper layers have received a relatively feeble dose of rays. Bulbs can be obtained whose radiation, after being filtered through 2 mm. of aluminium, will penetrate at least 3 to 4 cm. of tissue before falling to half value, and they can be excited by any good modern coil worked from the main. The fall in value at a depth of 1 cm. is so trifling that it may be disregarded. It may be objected that these very hard rays are lacking in therapeutic value. But Finzi and others have proved that this is by no means the case, and Hernaman-Johnson has himself brought about the healing of a patch of psoriasis after having passed such filtered rays through 2 cm. of water, at the same time carefully excluding all possibility of secondary ray effects. One must remember that the blood contains an appreciable amount of iron, the secondary radiation of which is highly active at short ranges. The trouble with very penetrating rays is not so much that they are inactive therapeutically as that a large proportion of their energy passes right through the lesion and is lost. By applying the principles of secondary ray therapy, this waste energy may be trapped and made to do work where it is most needed. For the past year Hernaman-Johnson has employed in the treatment of rodent ulcer hard filtered rays intensified by the specific secondary radiation from silver or zinc.

and is well pleased with the results so far; but it is as yet much too early to form any conclusion as to whether this modified technique materially reduces the tendency to relapse.

In treating rodent ulcers we can look out for and deal with small relapses, and there is little likelihood of dissemination. But in cancers of the viscera we cannot see what is going on, and it is therefore necessary always to give the largest amount of Roentgen rays which the skin will stand. *The risk of metastasis can be forestalled only by a careful study of the sites peculiar to each form of cancer, and by their prophylactic irradiation.*

When very stout subjects are concerned, the hardest existing bulb is not always capable of delivering an effective dose to an internal tumor without grave injury to the skin. We must therefore demand from the makers an increase in the penetrative power of their tubes. Although it is theoretically possible to construct tubes of much higher penetration, yet the practical difficulties in the way of increase are very considerable.

Personally Hernaman-Johnson is of the opinion that if tubes were made longer, of thicker glass, and with a wide space between the cathode and the walls, it would be possible to drive them at very high voltage without causing sparks to travel outside and break the glass. We should aim at a penetration at least double the maximum now attainable, and for this an equivalent spark-gap of 18 in. to 20 in. will be necessary.

Having obtained rays of such extreme hardness, we must learn how to utilize their energy to the best advantage. By the introduction of heavy atoms into tumor cells it is possible actually to produce a greater physiologic disturbance at a depth of 2 cm. than at the surface itself. Wassermann claims that he has succeeded in introducing selenium atoms into malignant cells without seriously affecting normal cells; when this can be accomplished easily and safely the problem of Roentgen ray dosage in deepseated cancer may be considered as solved. Granting that the physiologic action of Roentgen rays on the tissues is increased by the presence of heavy elements, the converse should also hold good. The diminution of the iron content of the skin by adrenalin prior to deep irradiation is therefore a procedure resting on a sound theoretic basis.

BOOK REVIEWS.

Die Röntgen-Literatur. Part II. Title index. By order of the Deutsche Röntgengesellschaft and in co-operation with the special committee. Prof. Dr. Hermann Gocht, Halle a. S.

Stuttgart, Ferdinand Enke. 1912. Pp. 508.

In time past the reviewer has, with some effort, attempted to maintain an index of roentgen literature. The result, attained with meagre facilities, has been crude and imperfect. The sole excuse for its continuance, the fact that (so far as the writer knew) no one was doing it better, and that it was being thankfully received by a considerable number of workers. Last year the first part of this work was issued, but, being indexed only by authors, was almost useless to American readers. The Deutsche Röntgengesellschaft then took the matter up and appointed a special committee of twelve to co-operate with Prof. Gocht to rewrite his work as a title-index.

The result is this magnificent book which renders all smaller effort not only needless but valueless.

Five divisions are made, each with several subdivisions. Books and Transactions, 17 pages; Physics and technic, 105 pages; Diagnosis, 234 pages; Therapy, 146 pages; Medicolegal, 6 pages.

Under each subdivision the former method of listing alphabetically by authors is retained. Americans will find this something of a handicap, but rather the less so, because of the comparatively small number of titles in each subdivision.

Among articles whose titles do not indicate their roentgenologic value, there are some important omissions as instanced by the one by Robert Jones on the knee-joint. Even in this class however the work has been comprehensive. As each title is given in the language in which it originally appeared, the book will be useful to the reader who has command of only one tongue.

For this sufficient reason the reviewer will hereafter direct his effort along other lines. D. R. B.

The Skiagraphy of the Accessary Nasal Sinuses by A. Logan Turner and W. G. Porter, published by Wm. Green & Son, Edinburg, 1912.

This volume which has just come to hand takes up in a very complete way the value of Roentgenography in the examination of the accessary sinuses. The writers discuss first in a comparatively brief manner the question of technique, laying especial emphasis upon the necessity of a careful choice of tube and accurate exposure. They do not however, accentuate the question of immobilization of the patient upon which fine bone detail will largely depend.

The next portion of the book deals with the interpretation of the normal appearance of the accessary cavities and this part of the work is especially valuable, as the interpretation is taken up quite in detail. The development of the sinuses in children is entered into and a number of valuable observations are made although the writers conclude that a larger number of cases should be examined before more definite statements can be made. The next part of the text takes up the interpretation of pathologic plates which occur in the back of the work.

The general conclusions which the writers present are a valuable and conservative statement of the value of Roentgenography in this special field of work; they are very careful not to be over enthusiastic upon the possibilities of this aid in diagnosis. In fact the enthusiast in this field might regard their statements as perhaps ultra conservative.

With regard to the illustrations which are full sized and reproduced by the half tone process, we can state that they are of high character and illustrate well the conditions which they are designed to show. Some of the plates however, show the slight movement of inaccurate fixation and the fine grain of the screen which has been employed. However, in as much as they are not reductions, these defects just mentioned are of minor importance, and the plates as a collection offer much material for interesting study and present certainly distinct educational features.

The text and reproductions form a volume which should be in the library of every special worker in Roentgenography and we take great pleasure in recommending it to the members of the American Roentgen Ray Society.

AMERICAN ROENTGEN RAY SOCIETY.

Minutes of the Proceedings of the Thirteenth Annual Meeting, held at Niagara Falls, New York, September 11 to 14, 1912, under the Presidency of Dr. Frederick H. Baetjer, Baltimore, Maryland.

FIRST DAY—MORNING SESSION.

The Society assembled in the International Hotel, and was called to order by the President at ten o'clock, with fifty members present.

The minutes of the preceding meeting were called for and the Secretary offered the minutes as printed in the QUARTERLY.

On motion, the minutes were approved as printed.

The Secretary, Dr. Pancoast, then made his report, and inasmuch as it contained a number of suggestions the report was referred for consideration to the Executive Committee.

At the request of the Treasurer, Dr. Charles F. Bowen, the reading of his report was deferred until a subsequent session.

The Chairman of the Executive Committee, Dr. Hickey, presented a brief verbal report, to the effect that the Committee had a number of questions under consideration on which a report would be made at a later session.

Dr. Hickey then presented the following amendment, which was read by the Secretary and referred for action on the next day:

To amend Art. IV, Section I, as follows: "The officers shall be a president, first and second vice president," the remainder of the section to read as at present, the change providing for two vice presidents, instead of five.

The Secretary then read a cablegram from the German Roentgen Society, signed by Dr. Koehler and Dr. Immelmann, wishing the American Roentgen Ray Society a very successful meeting. (Applause.)

On motion, the Secretary was instructed to write to the German Roentgen Society expressing the appreciation of this Society at being remembered at this time.

The Librarian, Mr. H. W. Dachtler, presented a brief verbal report. He stated that he now has twelve complete sets of the Quarterly and a number of reprints; that he was making provision for the proper housing of this material. He asked for instructions as to what disposition should be made of the material at hand.

Dr. A. L. Gray moved that the journals and other printed matter in the Librarian's charge be kept as the property of the Society, to be disposed of only by vote of the Society. Seconded and carried.

Dr. Kennon Dunham moved that a complete set of the journals be sent to Dr. Eichmann, with the compliments of the Society. Seconded and carried.

At this juncture the President announced that the polls would be open at twelve o'clock noon for the election of one member of the Executive Committee, in accordance with the amendment to the Constitution made at the previous annual meeting. The polls would close, he said, on the following day at twelve noon.

The Society then adjourned until 2 P. M.

AFTERNOON SESSION.

The Society reassembled at 2 P. M., and was called to order by the President.

The scientific portion of the program was then taken up. The first paper was read by Dr. E. H. Skinner, of Kansas City, Mo., on "Circulatory Opacities." No discussion.

Dr. Arthur F. Holding, of New York City, followed with a paper entitled "The Education of the Roentgenologist."

This paper was discused by Drs. Percy Brown, P. M. Hickey, W. H. Stewart, and in closing by the essayist.

Dr. David R. Bowen, of Philadelphia, contributed a paper entitled "The Library of the Roentgenologist." No discussion.

Dr. Paul Eisen, of Milwaukee, Wis., read a paper on "Description of a Safe and Practical Method of Combining Fluoroscopy with Radiography in Abdominal Diagnosis."

This paper was discussed by Dr. E. H. Skinner.

The next paper was read by Dr. J. T. Case, of Battle Creek, Mich., entitled "X-ray Studies of Colon Pathology with Special Reference to the Ileocecal Region."

Dr. E. H. Skinner, of Kansas City, Mo., then read a paper entitled "Fluoroscopy Versus Radiography in Gastro-Intestinal Diagnosis."

Dr. Max Kahn, of Baltimore, Md., by invitation, read a paper

entitled "The Roentgen Ray Study of Twenty-Two Cases of Ptosis of the Stomach and Colon Before and After Operation."

Dr. Sidney Lange, of Cincinnati, read a paper entitled "Abdominal Diagnosis."

These four papers were discussed by Drs. A. F. Holding, H. Hulst, G. E. Pfahler, Percy Brown, A. J. Quimby, A. L. Cole, W. H. Stewart, D. R. Bowen, W. S. Newcomet, F. H. Baetjer, P. Eisen, Cotton, J. T. Case, E. H. Skinner, Kahn, and Lange.

The Society then adjourned.

SECOND DAY—MORNING SESSION.

The Society reassembled at 9:30, and was called to order by the President.

The first paper was read by Dr. Russell H. Boggs, of Pittsburg, entitled "A Plea for More Conservative Treatment of Malignant Growths."

Dr. Chevalier Jackson, of Pittsburg, by invitation, discussed the question of "Conservative Surgery from a Laryngologic Viewpoint."

These two papers were discussed by Drs. G. E. Pfahler, A. M. Cole, Albert Soiland, W. T. Browne, H. W. Dachtler, K. Dunham, A. J. Quimby, P. M. Hickey, J. T. Case, Geo. C. Johnston, H. Humphries (London, England), Pirie, Boggs, and Jackson.

Here the Secretary read a cablegram of congratulation and best wishes from Drs. F. Haenisch and E. W. Caldwell.

Dr. A. W. Crane, of Kalamazoo, Mich., then read a paper entitled "Case Reports Illustrating the Roentgen Diagnostics of Internal Medicine," which was discussed by Drs. Lange, Gray, Eisen, Pfahler, Johnston, and in closing by the essayist.

A paper entitled "The Roentgen Ray in the Diagnosis of Sphenoidal Diseases" was read by Dr. Geo. E. Pfahler, and discussed by Drs. Pancoast, Baetjer, Johnston, Gray, W. H. Stewart, Quimby, Hickey and Pfahler, in closing.

The President announced that the polls were to be closed at twelve o'clock noon, and appointed Drs. T. S. Stewart and Dachtler to act as tellers.

The Society then adjourned.

AFTERNOON SESSION.

The meeting was called to order by the President at two o'clock.

The first paper on the program was read by Dr. Andre Crotti, of Columbus, Ohio, entitled "The Roentgen Examination of Goiter."

Dr. Charles F. Bowen, of Columbus, collaborated with Dr. Crotti in the preparation of this paper.

The discussion was participated in by Drs. Lange, Hulst, Pfahler, Hickey, Baetjer, Johnston, Percy Brown, Boggs, Dunham, Dachtler, Pirie, Quimby, and in closing by Drs. Charles F. Bowen and Andre Crotti.

On motion, a rising vote of thanks was extended to Dr. Crotti for his very excellent contribution.

The next paper was contributed by Dr. Kennon Dunham, of Cincinnati, entitled "Characteristic Plate Markings of Tubercular Cases with Reference to Children."

This paper was discussed by Drs. Hulst, Lange and Dunham.

Dr. Wm. H. Stewart, of New York City, then read a paper entitled "The Roentgen Ray as an Aid in the Diagnosis of Fractures of the Skull." No discussion.

On motion of Dr. Johnston, the Society then went into Executive Session.

The tellers announced that the votes cast for member of the Executive Committee had been counted, and that Dr. George C. Johnston, of Pittsburg, had received the greatest number of votes.

The Chair duly announced the result and declared Dr. Johnston elected.

Dr. Charles F. Bowen then presented the Treasurer's report, which was referred to the Executive Committee for audit.

Dr. Hickey, Chairman of the Executive Committee, reported that his Committee had carefully considered the suggestions contained in the report of the Secretary, and respectfully recommended that Dr. Wm. H. Sweet, of Philadelphia, be given honorary membership in the Society.

On motion, this recommendation was accepted.

The Committee further recommended that the President appoint a committee of three, to be known as the Committee on Nomenclature, said Committee to consider the preparation and prepare a report on the proper nomenclature of all matters connected with the Roentgen ray, the Committee to report later during this session.

Seconded and carried.

The Chair appointed on this Committee Drs. Fred. C. Zapffe, D. R. Bowen, and Percy Brown.

The Committee further recommended that the President appoint a committee on International Standards for the Measurement of the Roentgen Ray. Seconded and carried.

The Chair announced that this committee would be appointed later.

The Executive Committee reported favorably on the applications for membership of Drs. A. Hartung, Chicago; J. Daland, Philadelphia; Pirie, Montreal; Kost, ——; and Brosius, ——.

On motion, the report of the Executive Committee was accepted and the Secretary was instructed to cast the ballot of the Society for the election to membership of those named in the report.

The Executive Committee then proposed to amend the Constitution as follows:

Art. VII, Section 1: A standing committee of three, to be known as the Committee on Publication, shall have full charge of the publication of the proceedings of the Society. One member shall be elected to serve one year, one two years, and one three years, and thereafter one member shall be elected annually to serve three years. The members of this committee shall be nominated at the annual meeting by the Nominating Committee and elected by the vote of the majority of the members present at such annual meeting. The president, secretary and chairman of the Executive Committee to be members *ex-officio* of this committee. This committee shall appoint the editor of the AMERICAN QUARTERLY OF ROENTGENOLOGY.

The amendment to the Constitution proposed by Dr. Hickey on the previous day was then read, and, on motion, duly seconded. It was adopted. The amendment reads as follows:

"The officers shall be a president, first and second vice president," the remainder of the section to read as at present, the change providing for two vice presidents, instead of five.

The Chair then appointed the following Nominating Committee: Drs. Percy Brown, Russell H. Boggs and Roland Hammond.

On motion, a vote of thanks was extended to Dr. Leonard Reu and the other members of the local committee for the excellent arrangements made, and their untiring energy in making this a successful meeting.

Dr. Geo. E. Pfahler moved that messages of greeting be sent

to Dr. Charles L. Leonard, E. W. Caldwell, J. H. Edmonson, and G. P. Girdwood, who were unable to be present at this meeting.

Seconded and carried.

The Society then adjourned until 9 A. M.

THIRD DAY—MORNING SESSION.

The Society reassembled and was called to order by the President at ten o'clock.

Dr. Chevalier Jackson, of Pittsburg, addressed the Society on the subject of "Bronchoscopy and Esophagoscopy."

The subject was discussed by Drs. Johnston, Boggs, Hickey, C. F. Bowen, and Skinner.

The Society then adjourned until 2 P. M.

AFTERNOON SESSION.

The Society reassembled at 2 o'clock, and was called to order by Vice-President Eagar.

Mr. Sewall Cabot, of Boston, Mass., then read a paper by invitation entitled "A Comparative Analysis of the Energy Furnished by the Various Types of X-Ray Apparatus."

This paper was discussed by Mr. Snook, Mr. Dachtler, Dr. Percy Brown, and in closing by Mr. Cabot.

Mr. H. Clyde Snook, of Philadelphia, then gave a historic sketch with lantern slide illustration of "The Development of the X-Ray Tube."

The discussion on this subject was participated in by Drs. Percy Brown and Pirie.

Dr. Leonard Reu, of Buffalo, demonstrated an automatic switch.

Dr. D. R. Bowen, of Philadelphia, contributed an article entitled "Laboratory Notes," which was discussed by Drs. Imboden, Percy Brown, Holding, W. H. Stewart, Hickey, Johnston, Quimby, Pirie, and in closing by Dr. Bowen.

Dr. E. H. Skinner, of Kansas, City, Mo., presented "Designs and Plans for a Private X-Ray Laboratory."

On motion, the paper by Dr. J. H. Edmonson, of Birmingham, Ala., entitled "Indications for Massive and Small Dosage in Epitheliomata," and also the paper by Dr. Gerardo Balboni, of Boston, entitled "Artificial Pneumothorax in the Treatment of Pulmonary Tuberculosis," were read by title and ordered published in the QUARTERLY.

On motion, the Society then went into executive session.

The amendment to Article VII, offered by the Executive Committee, was again read and, on motion, duly seconded; it was adopted.

The Chair announced that the President had appointed as the Committee on International Standard Drs. E. W. Caldwell, George C. Johnston, and Pirie.

Dr. Percy Brown, Chairman of the Nominating Committee, then presented the following recommendations for the choice of officers for the coming year: President, Dr. Henry K. Pancoast, Philadelphia; Vice-Presidents, Drs. A. W. Crane, Kalamazoo, Mich., and Charles F. Bowen, Columbus, Ohio; Secretary, Dr. Sidney Lange, Cincinnati, Ohio; Treasurer, Dr. Leonard Reu, Buffalo, N. Y.; Librarian, Mr. H. W. Dachtler, Toledo, Ohio. The Committee asked for further time to make recommendations for the membership of the Publication Committee. The request was granted.

On motion of Dr. Johnston, the President was instructed to cast the ballot of the Society for the unanimous election to the offices named of the nominees, which he did.

The Society then rose from executive session and proceeded with the scientific program.

Dr. Alfred L. Gray, of Richmond, Virginia, presented a paper entitled "Roentgenization for Laryngeal Vegetations."

This paper was discussed by Drs. Hickey, Pancoast, Johnston, and in closing by the essayist.

The next paper, entitled "Adjuvants to Surgical Treatment of Malignancy," by Drs. L. G. Cole and A. F. Holding, of New York City, was read by Dr. Holding. It was discussed by Drs. Johnston, Pfahler, Dachtler, Crane, Pirie and Holding, in closing.

Dr. E. H. Skinner, of Kansas City, Mo., followed with a paper entitled "A Simplified Method of Prognosis in Fractures of the Ankle and Wrist."

The discussion of this paper was participated in by Drs. Reu, Hammond, Cotton, Dachtler, Baetjer, Gruber, and Skinner, in closing.

The scientific program outlined for the day having been completed, the Society again went into executive session.

The Nominating Committee completed its report by presenting for membership on the Publication Committee the following names: Drs. P. M. Hickey, one year; Dr. D. R. Bowen, two years; Dr. J. T. Case, three years.

On motion of Dr. Pfahler, the report was accepted and the Chair declared the members named duly elected.

Dr. Hickey then presented briefly for discussion the question of publishing in some form, such, perhaps, as an atlas, or a supplement to the QUARTERLY, prints of the best plates exhibited each year in the plate exhibit at the annual meeting.

On motion of Dr. Hull, the Publication Committee was empowered to publish prints of such plates as were passed on favorably by the Executive Committee, and in such form as was most practicable.

Dr. D. R. Bowen then moved the appointment of a committee which is to provide, at the expense of the Society, suitable means for illuminating the plate exhibit at the annual meeting. Seconded and carried.

The Society then adjourned until 9:30 A. M.

FOURTH DAY—MORNING SESSION.

The Society reassembled and was called to order by the President at 9:30 o'clock.

Dr. R. O. Meisenbach, of Buffalo, N. Y., read a paper entitled "Sacro-Iliac Relaxation."

The paper was discussed by Drs. Hammond, Johnston, Hickey, Coon, Dunham, Lange, Baetjer, and in closing by Dr. Meisenbach.

Dr. Roland Hammond, of Providence, R. I., followed with a paper entitled "What is the Roentgen Picture of Bone Tuberculosis?"

The discussion on this paper was opened by Dr. Hickey, and continued by Drs. Lange, Coon, Cotton, Baetjer, and closed by Dr. Hammond.

Dr. P. M. Hickey, of Detroit, Michigan, read a paper on "The Antero-Posterior Position in the Examination of Mastoids."

This paper was discussed by Drs. Lange, Pfahler, and Hickey, in closing.

A paper by Dr. E. H. Skinner, of Kansas City, Mo., entitled "Studies in Comparative Dental Anatomy" was ordered read by title and referred to the Publication Committee for publication in the QUARTERLY.

This concluded the scientific program of the thirteenth annual meeting, and the Society then went into executive session.

The Executive Committee reported that it had considered carefully the question of the place for holding the next annual

meeting, but was unable to arrive at a conclusion. The Committee, therefore, presented for the choice of the Society the names of the cities of Cleveland and Boston.

Dr. Dunham moved that the next annual meeting be held in Cleveland. Seconded. Lost.

The Chair then announced that inasmuch as the names of only two cities had been presented, and the Society having indicated by a vote that Cleveland was not the choice of the place for holding the next annual meeting, Boston is selected.

The Executive Committee recommended that Dr. Ball Butler, of Boston, be elected to active membership in the Society.

On motion, the recommendation was accepted and Dr. Butler was duly declared elected to membership.

Dr. Fred. C. Zapffe, the Chairman of the Nomenclature Committee, reported briefly that the Committee had considered the question of nomenclature as thoroughly as was possible in the time at its disposal, and that the task had been found so great that the Committee respectfully requested that it be allowed further time in which to make a report, or that a new Committee be selected to present a detailed report at the next annual meeting.

On motion, this Committee was continued, with instructions to report at the next annual meeting.

The Executive Committee reported that the Treasurer's books had been audited and found correct.

On motion, the report was accepted.

Dr. Baetjer, the retiring President, then presented to the Society the President-elect, Dr. Henry K. Pancoast.

Dr. Pancoast favored the Society with a few well-chosen words, which elicited great applause.

The President asked permission to defer naming the Committee which is to take charge of furnishing apparatus for illuminating the plates exhibited at the annual meeting until a later time. Such permission was granted.

Dr. Pfahler moved that a vote of thanks be extended to the outgoing officers for their excellent services. Seconded and carried.

Dr. Baetjer moved that a special vote of thanks be extended to Dr. Charles F. Bowen, the retiring Treasurer, for his untiring efforts on behalf of the Society, and for the splendid manner in which he had conducted the work of his office. Seconded and carried.

At this juncture, Dr. Pirie was given permission to exhibit a stereoscopic fluoroscope of his invention.

There being no further business to come before the Society, it adjourned, subject to call by the Executive Committee.

F. H. BAETJER,
President.

HENRY K. PANCOAST,
Secretary.

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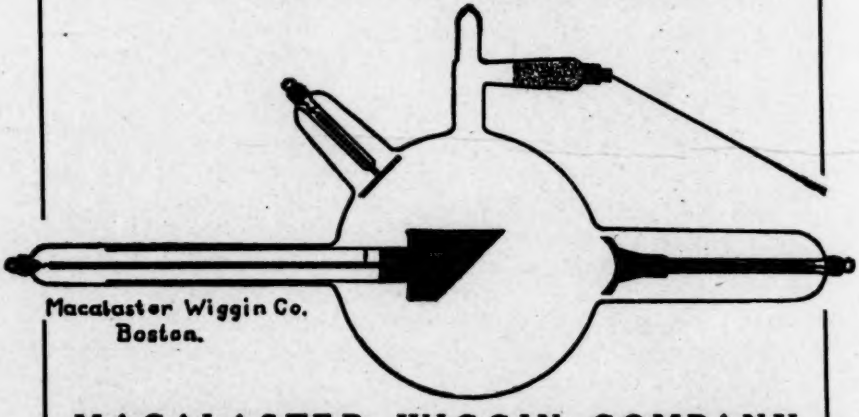

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